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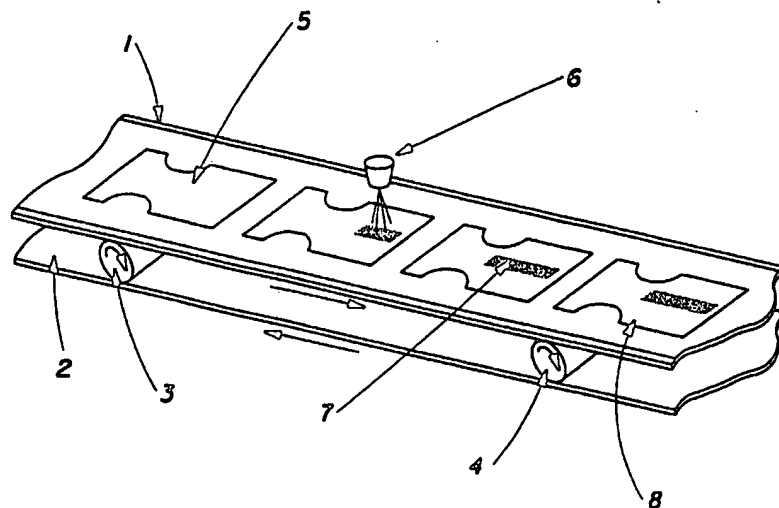
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(54) Title: PROCESS FOR INCORPORATING A SKIN CARE COMPOSITION ONTO AN ABSORBENT ARTICLE

(57) Abstract

Novel methods for applying skin care compositions to an absorbent article are disclosed. The invention provides methods for applying a skin care composition to absorbent articles such as diapers, training pants, adult incontinence devices, sanitary napkins, interlabial devices, and the like. More particularly, the present invention relates to methods for coating a skin care composition on the absorbent article's body-contacting surface, but necessarily applied directly to the body side of the substrate, that is transferable to a wearer's skin by normal contact, wearer motion and/or body heat.

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PROCESS FOR INCORPORATING A SKIN CARE COMPOSITION ONTO AN ABSORBENT ARTICLE

TECHNICAL FIELD

This application relates to methods for applying a skin care composition to absorbent articles such as diapers, training pants, adult incontinence devices, sanitary napkins, interlabial devices, and the like. More particularly, the present invention relates to methods for coating a skin care composition on the absorbent article's body-contacting surface, but necessarily applied directly to the body side of the substrate, that is transferable to a wearer's skin by normal contact, wearer motion and/or body heat.

BACKGROUND OF THE INVENTION

The major function of absorbent articles such as disposable diapers and incontinent briefs or undergarments is to absorb and contain body exudates. Such articles are thus intended to prevent body exudates from soiling, wetting, or otherwise contaminating clothing or other articles, such as bedding, that come in contact with the wearer. The most common mode of failure for such products occurs when body exudates leak out of the gaps between the article and the wearer's leg or waist to adjacent clothing because they are not immediately absorbed within the article and the absorbent article is not able to sustain a good fit on the wearer such that gaps are created allowing the exudates to leak out of the chassis of the absorbent article. For example, urine tends to be deposited into the topsheet in gushes such that the urine migrates to the gaps in the

chassis where it can come in contact with clothing or other articles and be absorbed by these articles. Additionally, loose fecal material that is not easily absorbed by the absorbent article tends to "float" on the liquid-receiving surface and work its way past the gaps in the article in the legs or waist of the wearer.

Contemporary disposable diapers have a topsheet, a backsheet, an absorbent core, and elasticized leg flaps generally formed from an elastic member being enclosed in the continuous topsheet and backsheet which extend beyond the edges of the absorbent core. These elasticized leg flaps prove effective generally to prevent wicking and overflow from the fluid laden diaper to clothing contacting the edges of the diaper in that the elasticized leg flaps present a fluid impervious barrier between the edge of the diaper and the contacting clothing, and in addition, provide a gasketing action about the legs of the wearer to maintain a seal about the leg and minimize gapping. However leakage along the perimeter of the diaper may still occur. As the diaper is worn for longer periods of time, forces tend to act on the diaper to degrade the initial fit on the wearer. Large gaps and sagging of the diaper in the legs and waist are formed by the degradation in fit. Thus, as liquids are deposited onto the topsheet, some of the liquid is not immediately absorbed through the topsheet and migrates toward the edges of the diaper where it can leak through or past the gaps in the diaper and come in contact with clothing or undergarments where it can be absorbed by and wicked into such garments.

Disposable diapers may be provided with barrier cuffs which inhibit loose fecal material or gushes of urine or liquids from soiling the wearer's clothing. The barrier cuffs restrain the free flow of this material and provide a structure to hold such material within the diaper so that as such material freely floats or flows on the topsheet of the diaper, it is contained within the diaper. Despite the effectiveness of such structures in containing such material, it has been found that liquids can leak through the barrier cuffs and soil the wearer's clothing. In addition, the barrier leg cuffs can cause skin marking in the area where the leg cuff contacts the skin.

It has now been discovered that applying a lotion coating on the surface of the leg cuffs that is transferable to the wearer's skin by normal contact and wearer motion and/or body heat can improve the containment characteristics, reduce skin irritation, of the diaper

as well as lead to improved ease of BM clean up. As used herein, the term leg cuff includes barrier leg cuffs, gasket cuffs and combinations and variations thereof. The coating of the cuffs with the lotions disclosed herein can increase the hydrophobicity of the cuffs, thereby improving the leakage performance. The hydrophobic lotion coating allows for flexibility in cuff designs using nonwoven materials by providing an alternate method to achieve the desired hydrophobicity. This can lead to reduced material costs. Importantly, the lotions disclosed in the present invention act to minimize the abrasion between the cuffs and skin in the area where the cuffs contact the wearer's skin, resulting in less skin irritation. The lotions also provide a protective coating on the wearer's skin that helps prevent the adherence of BM to the skin, thereby improving the ease of BM cleanup.

The method of applying a skin care composition to a web, the apparatus used for such a method, the post-treatment of a skin care composition once it is applied to a web and the apparatus therefor are all important in determining the effective use of the skin care composition for a user.

In particular, how a skin care composition is applied to a web, i.e., either directly or indirectly, can greatly affect the costs of such application. Also, the type and nature of the skin care composition application will affect the type of post-treatment performed on a skin care composition. For example, a skin care composition applied to a web at molten temperatures may either need drying, cooling or both before any other finishing steps can occur. In like fashion, a skin care composition which is applied to a web in a solid or nearly solid state may help to eliminate some or all possible post-treatment steps once the skin care composition has been applied to a web. Obviously, such considerations will affect the costs and management of a process involving the skin care compositions herein.

The methods for applying a skin care composition to a web herein provide new and improved methods for skin care compositions existing from the molten state to the solid state. Also, direct and indirect application of a skin care composition are provided. Additionally, methods of post-treatment of the skin care composition once it is applied to a web, regardless of its state, are provided. Lastly, methods of applying a skin care composition to various portions of an absorbent article herein are provided.

Accordingly, it is desirable herein to provide methods of direct application of a skin care composition to a web.

It is further a desirable objective herein to provide methods of indirect application of a skin care composition to a web.

It is also a desirable objective herein to provide suitable apparatus for applying a skin care composition to a web.

It is another objective herein to apply a skin care composition in all of its possible states ranging from a molten or liquid state to a nearly solid or solid state.

It is yet another desired objective herein to provide novel methods of post-treatment of the skin care composition onto a web such as heat-curing, drying, and/or cooling.

It is a further objective herein to provide optimal application of a skin care composition to a web, such as by providing optimal spraying conditions and configurations.

It is another objective herein to provide a skin care composition at the optimal angles, forces and pressures to a web to effect optimal placement of the skin care composition thereon.

Lastly, it is desirable to provide absorbent articles that: (1) have desirable therapeutic or protective coating skin care benefits, (2) do not adversely affect the absorbency of the absorbent article; and (3) do not require special wrapping or barrier materials for packaging.

SUMMARY OF THE INVENTION

Accordingly, the present invention relates to a method of making an absorbent article, having a skin care composition coated onto at least the body-contacting surface of the absorbent article, such skin care coating being adapted to be easily and readily transferred to a wearer's skin through the movement, body heat and positionings of a wearer within the absorbent article.

In one embodiment herein, a transfer apparatus may directly transfer the skin care composition to the web. Also, an additional step of transferring a skin care composition to a web may comprise holding the web under tension between at least two points as the skin care composition is transferred to the web. The web may comprise and/or be formed from nonwovens, polyethylenes, polypropylenes, rubber, combinations thereof, and all other materials applicable to the skin care composition processes described herein.

The skin care composition may be rolled onto at least one surface of the web. Such rolling may preferably be performed by a gravure coating device. Whatever the applicable rolling device, it will preferably comprise a first roller and a second roller positioned oppositely to the first roller. In such a case, this positioning will additionally preferably comprise the step of positioning the web between the first roller and the second roller. The skin care composition may be applied to the first roller such that the composition is transferred from the first roller to the web.

Alternatively, the first roller and the second roller may form a roller coater device. Preferably, a roller coater herein will comprise a hollow idler roller, a porous structure fitted about the idler roller, and a transporter device reaching through the idler roller into the porous structure to deliver the skin care composition to the porous structure.

Also alternatively, the transfer apparatus comprises a slot having a first plate and a second plate spaced apart from the first plate, a width and a slot exit positioned at the end of the slot. In one embodiment herein, the transferring step comprises extruding the skin care composition from the slot through the slot exit to the web. A preferred transfer apparatus having a slot is a slot coater device.

In one embodiment herein, the transfer step comprises applying the skin care composition to the first surface of the web and allowing the skin care composition to penetrate through the web onto the second surface of the web.

The skin care composition may also be sprayed onto the web. For example, in one embodiment herein, the transfer apparatus may comprise at least one sprayer mounted above the web to spray skin care composition onto the web. Preferably, at least one of the sprayers is mechanically manipulatable such that a sprayer may rotate about a point and

spray the skin care composition onto the web at various angles, distances or onto both sides of the web. Such a spraying device or station may preferably comprise an enclosure having at least one sprayer positioned therein, the method additionally comprising the step of conveying the web through the enclosure of the spraying device.

The transfer apparatus may propel the skin care composition through a spray nozzle with or without air or some other suitable gas. Also, spray patterns may be formed from such nozzle spray, i.e., nozzle manipulation of the sprayed skin care composition. Typical spray patterns may include, but are not restricted to, spirals, squares, stripes, circles, any of a number of multi-sided shapes, discontinuous shapes and combinations thereof. Such spraying of the skin care composition onto the web may be intermittent, continuous, and/or timed sprayed such that each sprayer, where more than one exists, is timed to spray at a certain point within the skin care composition coating process.

The skin care composition may also be cooled onto the web to solidify it on an absorbent article. This cooling may occur by either allowing the composition to cool over time in ambient temperatures, or by using a cooling device (or apparatus) to directly cool and solidify the skin care composition, or a combination of the two methods may be used. Alternatively, the cooling step may comprise air drying the skin care composition onto the web by forced air convection. Such air drying may use air or some gas at ambient temperatures or cooled temperatures. Alternatively, the skin care composition may be heat cured onto the web with or without subsequent cooling thereof.

In another skin care composition application method, the transfer apparatus may comprise a bath containing the skin care composition and idle rollers for manipulating the web into the bath of the skin care composition such that the skin care composition transfer step comprises the steps of positioning the web into the bath by manipulating the web about the idle rollers.

Additionally, the web may be conveyed to a forming apparatus. At the forming apparatus, the web may be manipulated to form a leg cuff or other member for an absorbent article such as a diaper. If the web is formed into a leg cuff, it can be formed

into either a barrier leg cuff, gasketing leg cuff or combinations thereof, all of which will be discussed in greater detail herein.

In the transferring step, the skin care composition may be applied to the web at varying concentration levels or densities on different portions of the web so as to form denser concentrations at different portions of the web. More specifically, some portions of the web will comprise more or less of the skin care composition than other portions as prescribed by a manufacturer. Also, the varying densities may form a discernible pattern, a pattern to meet a specific utility, aesthetic or performance objective, or a combination thereof. Where patterns may be formed, they may comprise spirals, squares, stripes, circles, any of a number of multi-sided shapes, discontinuous shapes and combinations thereof. Also, some areas of density may be colored to denote a presence of the skin care composition to a user.

An alternative application step may comprise the step of contacting the web to a secondary web and transferring substantially all of the skin care composition thereon onto the secondary web. An additional step herein may comprise contacting a third web to the second web and transferring substantially all of the skin care composition thereon to the third web.

In another embodiment herein, the transfer apparatus may comprise a chamber having an entrance way positioned at one end, an exit way positioned at the opposite end, and a screwing mechanism extending substantially from the entrance way to the exit way of the chamber. Also, the transfer step may further comprise conveying the skin care composition into the chamber of the transfer apparatus at the entrance way of the chamber. The skin care composition may be propelled through the chamber via mechanically moving the skin care composition through the chamber and out of the exit way by the screwing mechanism. The exit way of the chamber may comprise a nozzle. Also, the chamber of the transfer apparatus may be an extruder.

In an alternative embodiment herein, the transfer apparatus may comprise at least one cache or housing which encompasses the skin care composition, whereby at application of the skin care composition to the web, an effective amount of the skin care

composition is pushed through the cache and touches the web for transfer of an effective of the skin care composition to the web. The cached transfer apparatus may apply the skin care composition to the web at an application angle ranging from about 0° to about 360°. Preferably, the application angle may range from about 45° to about 135°. More preferably, the application angle ranges from about 75° to about 105°. In practice, the web is the point of reference, e.g., the x-axis. At the point of contact between the cached transfer apparatus and the web, an angle is formed between the two. That angle (e.g., α) is that angle described in the ranges of application angles supra. Preferably, the skin care composition will be solid or nearly solid at its application to a web.

Where the absorbent article is a diaper, the skin care composition may be applied substantially to the entire surface of the topsheet of the diaper web. Alternatively, the skin care composition may be applied to less than substantially the entire surface of the topsheet of the diaper web. Also alternatively, the skin care composition may be applied in a stripe along the surface of the topsheet of the diaper web or in any combination of discrete or continuous application in the cross-direction and/or machine-direction.

Of course, the web may either be a diaper web preferably comprising leg cuffs or it may be a web which will be later formed into leg cuff material for a diaper. Whichever, the leg cuffs will have a first surface facing upwards away from the web and a second surface facing down towards the web when the web is in a flattened-out, uncontracted position. In such a configuration of the web, the skin care composition is preferably applied substantially only to the first surface of the leg cuffs of the web. Alternatively, the skin care composition may be applied substantially to both the first and second surfaces of the leg cuffs of the web. Also, the skin care composition may be applied only to a portion of the leg cuffs of the web.

Like other portions of the diaper, the skin care composition may be applied in a stripe along the surface of the leg cuffs of the web. Also, the skin care composition may be applied nonuniformly or inconsistently onto the leg cuffs of the diaper web. By the terms "nonuniformly" or "inconsistently" it is meant herein that the skin care composition may be applied to the web or a portion thereof in spots or predetermined areas which are not connected to one-another.

All percentages, ratios and proportions used herein are by weight unless otherwise specified.

An exemplary method for applying a controlled and/or effective amount of a skin care composition to a web having a first surface and a second surface to form a web having a skin care composition immobilized on at least one surface thereof that is capable of being transferred from the web upon contact with skin comprises the following steps:

- a. providing at least one transfer apparatus with a skin care composition therein, the skin care composition comprising an emollient and an immobilizing agent;
- b. providing a web;
- c. positioning the web in proximity with the transfer apparatus; and
- d. applying an effective amount of the skin care composition to the web from the transfer apparatus such that at least a portion of the web has disposed thereon an effective amount of the skin care composition coating at least partially transferable at contact of the web, the skin care composition ranging from between a solid state to a liquid state at between about 20°C to about 204°C at application of the skin care composition to the web.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following descriptions which are taken in conjunction with the accompanying drawings in which like designations are used to designate substantially identical elements, and in which:

Figure 1 is a plan view of a disposable diaper embodiment of the present invention having portions cut away to reveal underlying structure;

Figure 2 is a fragmentary sectional view taken along section line 2 - 2 of Figure 1;

Figure 3 is a fragmentary sectional view taken along section line 3 - 3 of Figure 1;

Figure 4 is a perspective view of an absorbent article in the form of a disposable diaper according to the present invention;

Figure 5 is a schematic representation illustrating a preferred process for applying the skin care composition of the present invention to diaper barrier leg cuffs;

Figure 6 is a schematic representation illustrating an alternative process for applying the skin care composition of the present invention to diaper barrier leg cuffs;

Figure 7A is a perspective view of an alternative embodiment showing various, possible nozzle configurations for applying a skin care composition to a leg cuff web;

Figure 7B is a side view of an alternative embodiment of an application method for applying a skin care composition to a leg cuff web;

Figure 8 illustrates a preferred method involving the spraying of a skin care composition onto an article topsheet before the topsheet is assembled with the other raw materials into a finished product;

Figure 9 illustrates an alternative preferred method involving continuous or intermittent spraying of a skin care composition, preferably being lotion, onto an article topsheet during the converting operation;

Figure 10A is a partial side view of a contact applicator contacting a web herein;

Figure 10B is an embodiment of Fig. 10A wherein the contact applicator moves the web out of its original line of flow;

Figure 11A is a partial side view of an alternative embodiment of a contact applicator, web and idler herein;

Figure 11B is an embodiment of Fig. 11A wherein the contact applicator and idler contact the web; and

Figure 11C is a partial side view of an alternative embodiment of a contact applicator, web and idlers herein.

DETAILED DESCRIPTION OF THE INVENTION

As used herein, the term "comprising" means that the various components, ingredients, or steps, can be conjointly employed in practicing the present invention. Accordingly, the term "comprising" encompasses the more restrictive terms "consisting essentially of" and "consisting of." As used herein, the term "skin care composition" refers to a lubricious, soothing substance for the skin that is placed within an absorbent article as defined herein, lotion as described herein being a preferred example of such a skin care composition.

Treating Absorbent Articles With A Skin Care Composition

In one embodiment herein shown in Fig. 5, the transfer apparatus 6 directly transfers the skin care composition 12 to the web 15. Also, an additional step of transferring a skin care composition 12 to a web 15 may comprise holding the web 15 under tension between at least two points as the skin care composition 12 is transferred to the web 15. The web 15 may comprise and/or be formed from nonwovens, polyethylenes, polypropylenes, rubber, combinations thereof, and all other materials applicable to the skin care composition processes described herein.

The skin care composition 12 may be rolled onto at least one surface of the web 15. Such rolling may preferably be performed by a gravure coating device. Whatever the applicable rolling device, it will preferably comprise a first roller and a second roller positioned oppositely to the first roller. In such a case, this positioning will additionally preferably comprise the step of positioning the web between the first roller and the second roller. The skin care composition 12 may be applied to the first roller such that the composition is transferred from the first roller to the web. A typical gravure coating

device for use herein is disclosed in U.S. Patent No. 4,948,635 which is incorporated by reference herein.

Alternatively, the first roller and the second roller may form a roller coater device. Preferably, a roller coater herein will comprise a hollow idler roller, a porous structure fitted about the idler roller, and a transporter device reaching through the idler roller into the porous structure to deliver the skin care composition to the porous structure. A suitable roller coater for use in the present invention is disclosed in U.S. Patent Nos. 5,677,008 and 5,224,995, each such patent being incorporated by reference herein.

Also alternatively, the transfer apparatus comprises a slot having a first plate and a second plate spaced apart from the first plate, a width and a slot exit positioned at the end of the slot. In one embodiment herein, the transferring step comprises extruding the skin care composition from the slot through the slot exit to the web. A preferred transfer apparatus having a slot is a slot coater device. Suitable slot coater devices are disclosed in U.S. Patent No. 5,516,545, such patent being incorporated by reference herein.

In one embodiment herein, the transfer step comprises applying the skin care composition 12 to the first surface 3 of the web and allowing the skin care composition to penetrate through the web onto the second surface 1 of the web 15. (See Fig. 6).

The skin care composition 12 may also be sprayed onto the web 15. (See Fig. 7A). For example, in one embodiment herein, the transfer apparatus 6 may comprise at least one sprayer 125 mounted above the web 15 to spray skin care composition 12 onto the web 15. Preferably, at least one of the sprayers 125 is mechanically manipulatable such that a sprayer may rotate about a point and spray the skin care composition 12 onto the web 15 at various angles, distances or onto both sides of the web 15. Such a spraying device 125 or station 110 may preferably comprise an enclosure 112 having at least one sprayer 125 positioned therein, the method additionally comprising the step of conveying the web 15 through the enclosure 112 of the spraying device 110.

The transfer apparatus 6 may propel the skin care composition 12 through a spray nozzle with or without air or some other suitable gas. Also, spray patterns may be formed from such nozzle spray, i.e., nozzle manipulation of the sprayed skin care composition.

Typical spray patterns may include, but are not restricted to, spirals, squares, stripes, circles, any of a number of multi-sided shapes, discontinuous shapes and combinations thereof. Such spraying of the skin care composition 12 onto the web 15 may be intermittent, continuous, and/or timed sprayed such that each sprayer 125, where more than one exists, is timed to spray at a certain point within the skin care composition coating process.

The skin care composition 12 may also be cooled onto the web to solidify it on an absorbent article. This cooling may occur by either allowing the composition 12 to cool over time in ambient temperatures, or by using a cooling device (or apparatus) to directly cool and solidify the skin care composition, or a combination of the two methods may be used. Alternatively, the cooling step may comprise air drying the skin care composition onto the web by forced air convection. Such air drying may use air or some gas at ambient temperatures or cooled temperatures. Alternatively, the skin care composition may be heat cured onto the web with or without subsequent cooling thereof.

In another skin care composition application method, the transfer apparatus may comprise a bath as shown in Fig. 7' containing the skin care composition 12 and idle rollers for manipulating the web 15 into the bath of the skin care composition 12 such that the skin care composition transfer step comprises the steps of positioning the web 15 into the bath 25 by manipulating the web 15 about the idle rollers 13.

Additionally, the web 15 may be conveyed to a forming apparatus. At the forming apparatus, the web 15 may be manipulated to form a leg cuff or other member for an absorbent article such as a diaper. If the web is formed into a leg cuff, it can be formed into either a barrier leg cuff, gasketing leg cuff or combinations thereof, all of which will be discussed in greater detail herein.

In the transferring step, the skin care composition 12 may be applied to the web 15 at varying concentration levels or densities on different portions of the web 15 so as to form denser concentrations at different portions of the web 15. More specifically, some portions of the web 15 will comprise more or less of the skin care composition 12 than other portions as prescribed by a manufacturer. Also, the varying densities may form a

discernible pattern, a pattern to meet a specific utility, aesthetic or performance objective, or a combination thereof. Where patterns may be formed, they may comprise spirals, squares, stripes, circles, any of a number of multi-sided shapes, discontinuous shapes and combinations thereof. Also, some areas of density may be colored to denote a presence of the skin care composition to a user.

An alternative application step may comprise the step of contacting the web to a secondary web and transferring substantially all of the skin care composition 12 thereon onto the secondary web. An additional step herein may comprise contacting a third web to the second web and transferring substantially all of the skin care composition thereon to the third web.

In another embodiment herein, the transfer apparatus 6 may comprise a chamber having an entrance way positioned at one end, an exit way positioned at the opposite end, and a screwing mechanism extending substantially from the entrance way to the exit way of the chamber. Also, the transfer step may further comprise conveying the skin care composition into the chamber of the transfer apparatus at the entrance way of the chamber. The skin care composition may be propelled through the chamber via mechanically moving the skin care composition through the chamber and out of the exit way by the screwing mechanism. The exit way of the chamber may comprise a nozzle. Also, the chamber of the transfer apparatus may be an extruder. Suitable extruders for use in the present invention are disclosed in U.S. Patent Nos. 5,783,122, 5,673,612, and 5,599,096 such patents being incorporated by reference herein.

In an alternative embodiment herein, the transfer apparatus 6 may comprise at least one cache or housing which encompasses the skin care composition 12, whereby at application of the skin care composition 12 to the web 15, an effective amount of the skin care composition 12 is pushed through the cache and touches the web for transfer of an effective of the skin care composition 12 to the web 15. The cached transfer apparatus 6 may apply the skin care composition 12 to the web 15 at an application angle ranging from about 0° to about 360°. Preferably, the application angle may range from about 45° to about 135°. More preferably, the application angle ranges from about 75° to about 105°. In practice, the web is the point of reference, e.g., the x-axis. At the point of

contact between the cached transfer apparatus and the web, an angle is formed between the two. That angle (e.g., α) is that angle described in the ranges of application angles supra. Preferably, the skin care composition will be solid or nearly solid at its application to a web 15.

Where the absorbent article is a diaper, the skin care composition 12 may be applied substantially to the entire surface of the topsheet of the diaper web. Alternatively, the skin care composition 12 may be applied to less than substantially the entire surface of the topsheet of the diaper web. Also alternatively, the skin care composition may be applied in a stripe along the surface of the topsheet of the diaper web or in any combination of discrete or continuous application in the cross-direction and/or machine-direction.

Of course, the web may either be a diaper web preferably comprising leg cuffs or it may be a web which will be later formed into leg cuff material for a diaper. Whichever, the leg cuffs will have a first surface 3A (not shown but corresponding to the first surface 3 of the web 15) facing upwards away from the web and a second surface 1A (not shown but corresponding to the second surface 1 of the web 15) facing down towards the web 15 when the web 15 is in a flattened-out, uncontracted position. In such a configuration of the web 15, the skin care composition 12 is preferably applied substantially only to the first surface 3A of the leg cuffs of the web 15. Alternatively, the skin care composition 12 may be applied substantially to both the first and second surfaces (3A and 1A, respectively) of the leg cuffs of the web 15. Also, the skin care composition 12 may be applied only to a portion of the leg cuffs of the web 15.

Like other portions of the diaper, the skin care composition 12 may be applied in a stripe along the surface of the leg cuffs of the web. Also, the skin care composition 12 may be applied nonuniformly or inconsistently onto the leg cuffs of the diaper web. By the terms "nonuniformly" or "inconsistently" it is meant herein that the skin care composition may be applied to the web or a portion thereof in spots or predetermined areas which are not connected to one-another.

All percentages, ratios and proportions used herein are by weight unless otherwise specified.

In preparing absorbent articles according to the present invention, the skin care composition is preferably applied to the body contacting surface (i.e., body facing surface) of the absorbent article. It should be understood, however, that the methods described herein can be used to apply a skin care composition to any suitable portion of an absorbent article. In one non-limiting exemplary embodiment, the skin care composition will be described herein as being applied to a diaper leg cuff. As defined herein, the body contacting surface of a barrier leg cuff is normally the outer surface and the body contacting surface of a gasketing leg cuff is normally the front surface. However, a skin care composition such as lotion can penetrate through at least some of the leg cuff materials to the inner surface. So, applying a skin care composition such as lotion to the garment contacting surface of the leg cuffs (i.e., barrier leg cuff inner surface and/or gasketing leg cuff back surface) is also expressly within the scope of the present invention. Also note that a skin care composition can be applied in separate operations to both leg cuff surfaces, i.e., the body contacting surface and the garment contacting surface without penetration of the skin care composition from one leg cuff surface to another.

Any of a variety of application methods that distribute lubricious materials having a molten, semi-solid, solid or liquid consistency can be used. Suitable methods include spraying, printing (e.g., flexographic printing), coating (e.g., gravure or slot coating), extrusion, or combinations of these application techniques, e.g. spraying the skin care composition on a rotating surface, such as a calendar roll, that then transfers the composition to the body contacting surface of the diaper leg cuffs. Also, before the web is formed, the fibers thereof may be coated with a skin care composition; such coated fibers subsequently being formed into a web. If desired, a skin care composition such as lotion can also be applied to one or both sides of the leg cuffs to improve the leg cuffs' hydrophobicity. Also, lotion may be applied to a leg cuff with lotion in a solid form similar to that of Chapstick® lip balm. More specifically, tubes or cassettes of solid lotion may be applied by an apparatus directly to a nonwoven web or to a diaper web in a spaced configuration for application to the leg cuffs, topsheet, etc. This is a particularly

useful embodiment where it is desirable to apply a skin care composition which is solid or very nearly solid at ambient temperatures.

In one alternative embodiment, an entire web may be saturated within a skin care composition by immersing that web in a liquid bath thereof (See Fig. 7B). For example, a web 15 may be drawn through a liquid bath medium containing a skin care composition. The saturated web may be later cured or dried with the skin care composition thereon. Next, the lotion-containing, cured web may travel to a roll which winds-up the lotion-treated web, or the cured web may travel to a main diaper web application and be applied thereon as leg cuff material, topsheet material or any other suitable diaper components. This method is also applicable to other sorts of absorbent articles disclosed herein. This is an advantageous method of applying lotion because the curing process, while fixing a desired quantity of lotion onto the web, would also provide a measure of stability to the lotion whereby the lotion might be less likely to flow from one component, e.g., the leg cuffs, to another component such as the absorbent core or topsheet where such migration is not desired. Also, such curing or drying may be optimized to provide degrees of curing, i.e., lesser and greater amounts, to fix the lotion onto a web in whatever dried or semi-dried state desired. Again, this is to effect the state of lotion transfer from the leg cuffs to other parts of the diaper and to the skin of the wearer.

In another embodiment, a skin care composition may be applied to a web by spraying. For example, lotion may be sprayed directly onto a web at various angles providing either full coverage of the web with lotion or partial coverage of the web with lotion. One skilled in the art may imagine any variety of ways of applying the lotion to a web, all of which are within the scope of this invention. Again lastly, the lotioned web would preferably be cured or dried to fix the lotion onto the web. By the term "fix" it is meant herein the substantial securement of a skin care composition like lotion onto a web or separate material.

The minimum level of a skin care composition to be applied to the diaper leg cuff is the smallest amount effective (i.e., the effective amount) in reducing the abrasion between the leg cuffs and skin in the area where the leg cuffs contact the wearer's. The amount of the skin care composition could also be effective in reducing the adherence of

BM to the skin of the wearer. Of course, the effective amount of a lotion coating will depend, to a large extent, on the particular lotion composition used and the substrate to which lotion is applied. The lotion composition is preferably applied to the diaper leg cuffs of the present invention in an amount ranging from about 0.1 mg/in² to about 50 mg/in² more preferably from about 1 mg/in² to about 25 mg/in² (mg of lotion per square inch of coated leg cuff). Because the emollient is substantially immobilized on the surface of the leg cuff, less lotion composition is needed to impart the desired skin care benefits. Such relatively low levels of lotion composition are adequate to impart the desired therapeutic and/or protective lotion benefits to the leg cuff.

The skin care composition may be applied evenly and uniformly or unevenly and non-uniformly onto either (i.e., the first or second) or both surfaces of the leg cuff or portions thereof. The skin care composition coating may also be patterned (i.e., stripes, boxes, dots, spirals, etc.) Preferably, the skin care composition is registered with the region of the leg cuff that will, in use, be most in contact with the wearer and is applied in a stripe aligned with and centered on the longitudinal centerline of each leg cuff. Most preferably, as described in the Examples hereinafter, the skin care composition is applied in a stripe to a discrete portion of the barrier leg cuff, e.g., on a 1.4 inch wide (diaper lateral direction) and 11.75 inch long (diaper longitudinal direction) patch generally disposed in the crotch portion of the inner surface of the barrier leg cuff. It is noted herein that the width and length of applied lotion can be lesser than or greater than 1.4 inches and 11.75 inches, respectively.

The skin care composition can also be applied nonuniformly to either or both surfaces of the diaper leg cuff. By "nonuniform" or "nonuniformly" it is meant herein that the amount, pattern of distribution, etc. of the skin care composition can vary over the leg cuff surface. For example, some portions of the treated surface of the leg cuff can have greater or lesser amounts of skin care composition, including portions of the surface that do not have any skin care composition on it.

The skin care composition can be applied to the leg cuff at any point during assembly. For example, the skin care composition can be applied to the leg cuff of the finished disposable absorbent product before it has been packaged. The skin care

composition can also be applied to the leg cuff in the form of a web before it is combined with the other raw materials to form a finished disposable absorbent product.

For example, a lotion composition is typically applied from a melt thereof to the diaper leg cuff. Since the skin care composition melts at significantly above ambient temperatures, it is usually applied as a heated coating to the leg cuff. Typically, the lotion composition is heated to a temperature in the range from about 35° to about 204°C, preferably from 40° to about 90°C, prior to being applied to the diaper leg cuff. Once the melted lotion composition has been applied to the diaper leg cuff, it is allowed to cool and solidify to form solidified coating or film on the surface of the leg cuff. Preferably, the application process is designed to aid in the cooling/set up of the lotion.

In applying skin care compositions of the present invention to diaper leg cuffs, slot coating, extrusion coating, gravure coating, and spraying methods are preferred. Figure 5 illustrates a preferred method involving continuous or intermittent contact slot coating of the skin care composition on to a diaper barrier leg cuff during the converting operation. Referring to Figure 5, conveyor belt 1 advances in the direction shown by the arrows on the turning rolls 13 and 14 and becomes returning conveyor belt 2. When applying a skin care composition, conveyor belt 1 carries nonlotioned diaper 5 to contact slot coating station 6 where barrier leg cuff patch 7 is coated with a hot, molten (e.g., 65°C), preferably, lotion composition. After leaving the transfer apparatus 6 (i.e., slot coating station 6), nonlotioned diaper 5 becomes lotioned diaper 8 having lotioned barrier leg cuffs. The amount of lotion composition transferred to barrier leg cuff patch 7 is controlled by: (1) the rate at which the molten lotion composition is applied from contact slot coating station 6; and/or (2) the speed at which conveyor belt 1 travels under slot coating station 6.

Figure 6 illustrates an alternate preferred method involving contact slot coating of the lotion composition on the diaper barrier leg cuffs before the leg cuffs are assembled with the other raw materials into a finished product. Referring to Figure 6, a nonwoven barrier leg cuff web 1 is unwound from parent barrier leg cuff roll 2 (rotating in the direction indicated by arrow 2a) and advanced to the contact slot coating station 6 where one side of the web is coated with a hot, molten (e.g., 65°C) skin care composition (e.g.,

lotion). After leaving slot coating station 6, nonwoven barrier leg cuff web 15 becomes a lotioned barrier leg cuff web. Lotioned barrier leg cuff web 15 is then advanced around turning roll 4 and turning roll 8, and then wound up on lotioned barrier leg cuff parent roll 10 (rotating in the direction indicated by arrow 10a). Alternatively, the nonwoven web 1 may be unwound from parent barrier leg cuff roll 2, advanced to the contact slot coating station 6, coated with lotion, or some other skin care composition, in a desired manner, and then re-wound back around parent barrier leg cuff roll 2, thus reducing the need for additional rolls.

In another alternate embodiment herein, Figure 7 illustrates a method where a leg cuff web 1 is rolled through a spray station (i.e. transfer apparatus) 110 in which the web is sprayed with a skin care composition. As shown, spray nozzles 125 may be positioned from any side of the web 1, at various angles, and any number of nozzles desired may be used to spray skin care compositions onto the web. The spray station 110 of Fig. 7 may be in an enclosed unit such that any sprayed composition, e.g., lotion, that does not adhere to the leg cuff web may be captured by a receptacle positioned beneath the web. In Fig. 7, the web 1 is moving in the direction of the arrows.

SPECIFIC ILLUSTRATIONS OF THE PREPARATION OF DIAPER BARRIER LEG CUFFS HAVING A SKIN CARE COMPOSITION THEREON ACCORDING TO THE PRESENT INVENTION

The following are specific illustrations of treating diaper barrier leg cuffs with a skin care composition, particularly lotion compositions in accordance with the present invention:

Example 1

A. Preparation of Lotion Composition

A water free lotion composition (Lotion A) is made by mixing the following melted (i.e., liquid) components together: Mineral Oil (Carnation White Mineral Oil, USP made by Witco Corp.); Cetearyl Alcohol (a mixed linear C₁₆-C₁₈

primary alcohol made by the Procter & Gamble Company under the name TA-1618); and Steareth-2 (Brij 72, a C₁₈ linear alcohol ethoxylate having an average degree of ethoxylation of 2, made by ICI America). The weight percentages of these components are shown in Table I below:

Table I

Component	Weight %
Mineral Oil	50
Cetearyl Alcohol	35
Steareth-2	15

B. Preparation of Lotioned Diaper Leg cuff by Hot Melt Coating

Lotion Composition A is placed into a heated tank operating at a temperature of 76°C. The composition is subsequently applied with a contact applicator (e.g., a Meltex EP45, a Meltex EP11 or similar device having a hot melt adhesive applicator head operating at a temperature of 76°C) onto the outer surface of the barrier leg cuffs of a diaper in at least a 0.5 inch wide (diaper lateral direction) and 11.75 inch long (diaper longitudinal direction) area, the patch centered in the contracted area of the leg cuff. Add-on level = 11.6 mg/in² (18.0 g/m²).

Example 2

The lotion composition A (prepared in accordance with the procedure in Example 1) is subsequently applied onto the outer surface of the barrier leg cuffs of a diaper in a 1.4 inch wide (diaper lateral direction) stripe on the longitudinal centerline of each leg cuff and extending along the leg cuff. Add-on level = 11.6 mg/in² (18 g/m²).

Example 3

The lotion composition A (prepared in accordance with the procedure in Example 1) is subsequently applied onto the outer surface of the barrier leg cuffs of a diaper in a 1.4 inch wide (diaper lateral direction) stripe centered on the longitudinal centerline of each leg cuff and 11.75 inch long (diaper longitudinal direction) area, the patch centered in the contracted area of the leg cuff. Add-on level = 7.7 mg/in^2 (12.0 g/m^2).

Example 4A. Preparation of Lotion Composition

A water free lotion composition (Lotion B) is made by mixing the following melted (i.e., liquid) components together: Mineral Oil (Carnation White Mineral Oil, USP made by Witco Corp.); and Cetearyl Alcohol (a mixed linear C₁₆-C₁₈ primary alcohol made by the Procter & Gamble Company under the name TA-1618). The weight percentages of these components are shown in Table II below:

Table II

Component	Weight %
Mineral Oil	65
Cetearyl Alcohol	35

B. Preparation of Lotioned Leg cuffs by Hot Melt Coating

Lotion Composition B is placed into a heated tank operating at a temperature of 76°C. The composition is subsequently applied with a contact applicator (i.e., a

Meltex EP45, Meltex EP11 or similar device having a hot melt adhesive applicator head operating at a temperature of 76°C) onto the barrier leg cuffs of a diaper in a 1.4 inch wide (diaper lateral direction) and 11.75 inch long (diaper longitudinal direction) area, the patch centered in the contracted area of the leg cuff. Add-on level = 11.6 mg/in² (18.0 g/m²).

Example 5

A. Preparation of Lotion Composition

A water free lotion composition (Lotion C) is made by mixing the following melted (i.e., liquid) components together: White Protopet® 1S (white petrolatum made by Witco Corp.); Stearyl Alcohol (a linear C₁₈ primary alcohol made by the Procter & Gamble Company under the name CO-1897B); and Veragel 1:1 Lipoid with Kaydol (aloe extract made by Dr. Madis Laboratories, Inc.). The weight percentages of these components are shown in Table III below:

Table III

Component	Weight %
WhiteProtopet® 1S	58
Stearyl Alcohol	41
Aloe	1

Preparation of Lotioned Diaper by Hot Melt Coating

Lotion Composition C is placed into a heated tank operating at a temperature of 76°C. The composition is subsequently applied with a contact applicator (i.e., a Meltex EP45, Meltex EP11 or similar device having a hot melt adhesive applicator head operating at a temperature of 76°C) onto the barrier leg cuffs of a diaper in a 1.4 inch wide (diaper lateral direction) and 11.75 inch long (diaper longitudinal

direction) area, the patch centered in the contracted area of the leg cuff. Add-on level = 11.6 mg/in² (18.0 g/m²).

Example 6

A. Preparation of Lotion Composition

A water free lotion composition (Lotion D) is made by mixing the following melted (i.e., liquid) components together: White Protopet® 1S (white petrolatum made by Witco Corp.); Cetearyl Alcohol (a mixed linear C₁₆-C₁₈ primary alcohol made by the Procter & Gamble Company under the name TA-1618); Ceteareth 10 a C₁₆-C₁₈ linear alcohol ethoxylate having an average degree of ethoxylation of 10, made by ICI America; and Veragel 1:1 Lipoid with Kaydol (aloe extract in mineral oil made by Dr. Madis Laboratories, Inc.). The weight percentages of these components are shown in Table IV below:

Table IV

Component	Weight %
WhiteProtopet® 1S	49
Stearyl Alcohol	35
Ceteareth 10	15
Aloe	1

B. Preparation of Lotioned Diaper by Hot Melt Coating

Lotion Composition D is placed into a heated tank operating at a temperature of 76°C. The composition is subsequently applied with a contact applicator (i.e., a Meltex EP45, Meltex EP11 or similar device having a hot melt adhesive applicator head operating at a temperature of 76°C) onto the barrier leg cuffs of a diaper in a 1.4 inch wide (diaper lateral direction) and 11.75 inch long (diaper longitudinal

direction) area, the patch centered in the contracted area of the leg cuff. Add-on level = 11.6 g/in² (18.0 g/m²).

Treating Absorbent Article Topsheets With Skin Care Compositions

In preparing products according to the present invention, the skin care composition is preferably applied to the outer surface (i.e., body facing surface) of an article topsheet. Any of a variety of application methods that distribute lubricious materials having a molten, liquid, solid, or semi-solid consistency can be used. Suitable methods include spraying, printing (e.g., flexographic printing), coating (e.g., gravure coating), extrusion, or combinations of these application techniques, e.g. spraying a lotion composition onto a rotating surface, such as a calendar roll, that then transfers the composition to the outer surface of the article topsheet. Also, a skin care composition may be applied to a topsheet when in a solid form similar to that of Chapstick® lipbalm. More specifically, tubes or cassettes of solid lotion may be applied directly to a nonwoven web or to an absorbent article web (e.g., diaper) in a spaced configuration for application to the topsheet, leg cuffs, etc. This is a particularly useful embodiment where it is desirable to apply a skin care composition which is solid or very nearly solid at ambient temperatures.

In one embodiment herein, the manner of applying the skin care composition to the article topsheet should be such that the topsheet does not become saturated with the skin care composition. However, localized points of saturation on the topsheet, leg cuffs, side panels, etc. are contemplated as well as a fully saturated topsheets especially where a skin care composition is hydrophilic. Saturation of the topsheet is not required to obtain the therapeutic and/or protective skin care benefits. Particularly suitable application methods will apply the skin care composition to the outer surface of the article topsheet.

The minimum level of lotion to be applied to the article topsheets is an amount effective (i.e., the effective amount) for reducing the adherence of BM to the skin and/or providing a skin benefit to the wearer. The level of skin care composition applied will depend on various factors, including the relative amount of surface area of the topsheet

not treated with a skin care composition such as lotion, the lotion composition, the make-up of the substrate/web having the lotion applied thereon, and the like. In general, with skin care compositions that are relatively hydrophobic and that are to be applied to essentially all of the topsheet, the skin care composition is preferably applied to the article topsheet in an amount ranging from about 0.15 g/m^2 to about 500 g/m^2 . It will be recognized that for lotions that are relatively hydrophilic, higher add-on levels may be used without adversely impacting fluid handling properties of the topsheet to an unacceptable degree. Because the emollient is substantially immobilized on the surface of the topsheet, less lotion composition is needed to impart the desired skin care benefits. Such relatively low levels of lotion composition are adequate to impart the desired therapeutic and/or protective skin care benefits to the topsheet, yet do not saturate the topsheet's absorbency and/or wettability properties.

The skin care composition may be applied to the entire surface of the topsheet or portions thereof. In one embodiment, the skin care composition is applied in a stripe aligned with and centered on the longitudinal centerline of the disposable absorbent article. In this embodiment, as described in the Examples hereinafter, the lotion composition is preferably applied to a discrete version of the topsheet, e.g., a 3.75 inch wide (article lateral direction) and from as short as 0.5 in. to the entire length of the absorbent article whether a diaper, incontinent device, etc. A preferred length range is from about 7 inches to about 12 inches long (article longitudinal direction). In another embodiment herein, the skin care composition is applied to the entire surface of the topsheet body facing surface. Furthermore, areas of the body facing topsheet have regions of greater lotion concentration than other regions. That is, more of the skin care composition will lie in some areas of the topsheet than other areas. These regions of greater concentration of the skin care composition may be in any pattern desired such as stripes, spirals, dots, shapes, etc. Also, certain regions of the skin care composition may be colored to signal their presence and/or to create figures or characters to give an aesthetic appeal.

As discussed, the skin care composition can also be applied nonuniformly to the outer surface of the article topsheet. By "nonuniform" or "nonuniformly" it is meant herein that the amount, location, pattern of distribution, etc. of a skin care composition can

vary over the topsheet surface. For example, some portions of the treated surface of the topsheet can have greater or lesser amounts of skin care composition, including portions of the surface that do not have any of the skin care composition on it. In a preferred embodiment, the surface of the topsheet will have regions where no skin care composition is applied, particularly in areas of the topsheet that correspond to the crotch region of the article. As used herein, the crotch region of the article is the rectangle, defined below, that is centered longitudinally and laterally about the article's crotch point. The "crotch point" is determined by placing the article on a wearer in a standing position and then placing an extensible filament around the legs in a figure eight configuration. The point in the article corresponding to the point of intersection of the filament is deemed to be the crotch point of the article. It is understood that the crotch point is determined by placing the absorbent article on a wearer in the intended manner and determining where the crossed filament would contact the article. The length of the crotch region corresponds to 40% of the absorbent article's total length (i.e., in the y-dimension). The width of the crotch region is equivalent to the width of the widest absorbent core component as measured at the crotch point. (As used herein, "absorbent core" components are those materials involved with acquiring, transporting, distributing and/or storing body fluids. As such, the term absorbent core does not include the topsheet or backsheet of the absorbent article.) By way of illustration, for an article having a length of 20 in. and a core width at the crotch point of 4 in., the crotch region is the rectangle, centered on the crotch point, having a length of 8 in. and a width of 4 in.

For certain skin care compositions (e.g., those that are hydrophobic), these untreated regions further facilitate liquid passage through the topsheet and into the absorbent core. Surprisingly, while the topsheet is treated nonuniformly (e.g., the topsheet has microscopic or macroscopic regions where no skin care composition is applied), during wear of the article, a skin care composition such as lotion is transferred to the wearer even in regions of the skin corresponding to unlotioned or lesser lotioned regions of the topsheet. The amount and uniformity of lotion transferred to the skin is believed to depend on several factors, including, for example, contact of the wearer's skin to the topsheet, friction created during wear time between the wearer's skin and the treated topsheet, warmth generated from a wearer to enhance the transfer of the lotion, the lotion properties,

lotion composition, the relative movement of a wearer to the regions of the topsheet containing the skin care composition, and the like.

Where a skin care composition is applied nonuniformly, any method of application may be utilized, including, for example, application of small droplets (obtained via, e.g., spraying) discrete dots (obtained via, e.g., gravure printing), stripes that run in the longitudinal or lateral direction of the article, etc. In those embodiments where the topsheet comprises discrete, untreated regions, the percent open area of the region of the topsheet that corresponds to the crotch region of the article can vary widely. (As referred to herein, the "percent open area" of the topsheet is determined by (i) measuring the surface area of the topsheet that overlies the crotch region, (ii) measuring the total surface area of the untreated region(s) in this portion of the topsheet and (iii) dividing the measurement in (ii) by the measurement in (i). As used herein, "untreated" means a region of the topsheet having less than about 0.01 g/m^2 . In this regard, the percent open area may be from about 1% to about 99%, from about 5% to about 95%, from about 10% to about 90%, from about 15% to about 85%, from about 20% to about 80%, from about 25% to about 75%, from about 30% to about 70%, or from about 35% to about 65%. The percent open area required to achieve the desired skin care effect and the desired fluid handling properties of the topsheet will be dictated largely by the characteristics of the skin care compositions (e.g., a lotion's composition and its relative hydrophobicity/hydrophilic properties).

In general, with skin care compositions that are relatively hydrophobic and are to be applied such that regions of the topsheet are not coated with a skin care composition, the skin care composition is preferably applied to the article topsheet in an amount ranging from about 0.15 g/m^2 to about 50 g/m^2 . It will be recognized that for skin care compositions that are relatively hydrophilic, higher add-on levels may be used without adversely impacting fluid handling properties of the topsheet to an unacceptable degree. Of course, for articles having relatively high percent open areas in the crotch, greater add-on levels may be obtainable without adversely affecting fluid handling by the topsheet.

In one preferred embodiment, the topsheet comprises stripes of a skin care composition such as lotion that run in the article's longitudinal direction. These

longitudinal stripes of lotion are separated by longitudinal stripes where little or no lotion is applied to the topsheet. In these embodiments, each lotion stripe will typically have a width of from about 0.1 in. to about 0.75 in., more typically from about 0.1 in. to about 0.5 in., and the width of the stripes containing no lotion will typically be from about 0.1 in. to about 1 in., more typically from about 0.15 in. to about 0.5 in.

The skin care composition can be applied to the topsheet at any point during assembly. For example, a lotion composition can be applied to the topsheet of the finished disposable absorbent product before it has been packaged. The lotion composition can also be applied to the topsheet before it is combined with the other raw materials to form a finished disposable absorbent product.

As the preferred skin care composition, a lotion composition is typically applied from a melt thereof to the article topsheet. Since the lotion composition melts at significantly above ambient temperatures, it is usually applied as a heated coating to the topsheet. Typically, the lotion composition is heated to a temperature in the range of from about 35°C to about 204°C, preferably from about 40°C to about 90°C, prior to being applied to the article topsheet. Once the melted lotion composition has been applied to the article topsheet, it is allowed to cool and solidify to form a semi-solid or solidified coating or film on the surface of the topsheet. Preferably, the application process is designed to aid in the cooling/set up of the lotion.

In applying skin care compositions of the present invention to article topsheets, contact application, contact slot coating, spraying, gravure coating and extrusion coating methods are preferred. Figure 8 illustrates one such preferred method involving spraying of the coating on the article topsheet before the topsheet is assembled with the other raw materials into a finished product. Referring to Figure 8, a nonwoven topsheet web 1 is unwound from parent topsheet roll 2 (rotating in the direction indicated by arrow 2a) and advanced to applicator station 6 where one side of the web is sprayed with a hot, molten (e.g., 65°C) lotion composition. After leaving applicator station 6, nonwoven topsheet web 1 becomes a lotioned topsheet web indicated by 3. Lotioned topsheet web 3 is then advanced around turning roll 4 and turning roll 8, and then wound up on lotioned topsheet

parent roll 10 or straight into the diaper converting process (rotating in the direction indicated by arrow 10a).

Figure 9 illustrates an alternative preferred method involving continuous or intermittent application of a skin care composition, preferably being lotion, onto an article topsheet during the converting operation. Referring to Figure 9, conveyor belt 1 advances in the direction shown by the arrows on turning rolls 3 and 4 and becomes returning conveyor belt 2. Conveyor belt 1 carries nonlotioned article 5 to spray station 6 where topsheet patch 7 is sprayed with a hot, molten (e.g., 65°C) lotion composition. After leaving applicator station 6, nonlotioned article 5 becomes lotioned article 8 having a lotioned topsheet. The amount of lotion composition transferred to topsheet patch 7 is controlled by: (1) the rate at which the molten lotion composition is applied from applicator station 6; and/or (2) the speed at which conveyor belt 1 travels under applicator station 6.

SPECIFIC ILLUSTRATIONS OF THE PREPARATION OF LOTIONED
ABSORBENT ARTICLE TOPSHEETS ACCORDING TO THE PRESENT
INVENTION

The following are specific illustrations of treating absorbent article topsheets with skin care compositions, specifically lotion, in accordance with the present invention:

Example 1

A. Preparation of Lotion Compositions

A water free lotion composition (Lotion A) is made by mixing the following melted (i.e., liquid) components together: Mineral Oil (Carnation White Mineral Oil, USP made by Witco Corp.), Cetearyl Alcohol (a mixed linear C₁₆-C₁₈ primary alcohol made by the Procter & Gamble Company under the name TA-1618); Steareth-2 (Brij 72, a C₁₈ linear alcohol ethoxylate having an average degree of ethoxylation of 2, made by ICI America). The weight percentages of these components are shown in Table I below:

Table I

Component	Weight %
Mineral Oil	50
Cetearyl Alcohol	35
Steareth-2	15

B. Preparation of Lotioned Article Topsheet by Hot Melt Spraying

Lotion Composition A is placed into a heated tank operating at a temperature of 76°C. The composition is subsequently applied with a contact applicator (using, for example, a Meltex EP45, Meltex EP11 or similar device having a hot melt adhesive applicator head having 5 slots and operating at a temperature of 76°C) onto the topsheet of an article in a striped pattern where the stripes run in the article's longitudinal direction. Specifically, 5 stripes are applied, each stripe measuring 0.25 in. wide (i.e., in the articles lateral direction) and 11.75 in. long at an add-on level = 7.7 mg/in^2 (12 g/m^2). The distance between the stripes is 0.31 in.

Example 2

The lotion composition A (prepared in accordance with the procedure in Example I) is subsequently sprayed onto the topsheet of a article in a 3.75 inch wide (article lateral direction) stripe centered on the longitudinal centerline and extending the entire length of the product. Add-on level = 6 mg/in^2 (9.3 g/m^2).

Example 3

The lotion composition A (prepared in accordance with the procedure in Example I) is subsequently sprayed onto the topsheet of a article in a 3.75 inch wide (article lateral direction) stripe centered on the longitudinal centerline and 7 inch long (article longitudinal direction) area, the patch beginning 1 inch forward of the lateral centerline and extending toward the rear of the product. Add-on level = 3 mg/in² (4.65 g/m²).

Example 4

A. Preparation of Lotion Compositions

A water free lotion composition (Lotion B) is made by mixing the following melted (i.e., liquid) components together: Mineral Oil (Carnation White Mineral Oil, USP made by Witco Corp.), and Cetearyl Alcohol (a mixed linear C₁₆-C₁₈ primary alcohol made by the Procter & Gamble Company under the name TA-1618). The weight percentages of these components are shown in Table II below:

Table II

Component	Weight %
Mineral Oil	65
Cetearyl Alcohol	35

B. Preparation of Lotioned Tissue by Hot Melt Spraying

Lotion Composition B is placed into a heated tank operating at a temperature of 52°C. The composition is subsequently sprayed (using a Dynatec E84B1758 spray head, operating at a temperature of 74°C and an atomization pressure of 2.40 psig) onto the topsheet of a article in a 3.75 inch wide (article lateral direction) and 7 inch long (article longitudinal direction) area, the patch beginning 1 inch

forward of the lateral centerline and extending toward the rear of the product.
Add-on level = 6 mg/in² (9.3 g/m²).

Example 5

A. Preparation of Lotion Composition

A water free lotion composition (Lotion C) is made by mixing the following melted (i.e., liquid) components together: White Protopet® 1S (white petrolatum made by Witco Corp.), Cetearyl Alcohol (a mixed linear C₁₆-C₁₈ primary alcohol made by the Procter & Gamble Company under the name TA-1618); Steareth-2 (Brij 762, a C₁₈ linear alcohol ethoxylate having an average degree of ethoxylation of 2 made by ICI America). The weight percentages of these components are shown in Table I below:

A water free lotion composition (Lotion C) is made by mixing together the following melted (i.e., liquid) components in the weight percentages shown in the Table III below according to the procedure of Example 2:

Table III

Component	Weight %
WhiteProtopet® 1S	50
Cetearyl Alcohol	35
Steareth-2	15

B. Preparation of Lotioned Tissue by Hot Melt Spraying

Lotion Composition C is placed into a heated tank operating at a temperature of 52°C. The composition is subsequently sprayed (using a Dynatec E84B1758 spray head, operating at a temperature of 74°C and an atomization pressure of 2.40

psig) onto the topsheet of a article in a 3.75 inch wide (article lateral direction) and 7 inch long (article longitudinal direction) area, the patch beginning 1 inch forward of the lateral centerline and extending toward the rear of the product. Add-on level = 6 mg/in² (9.3 g/m²).

Example 6

A. Preparation of Lotion Composition

A water free lotion composition (Lotion D) is made by mixing the following melted (i.e., liquid) components together: White Protopet® 1S (white petrolatum made by Witco Corp.); Dow Corning 556 Cosmetic Grade Fluid(a polyphenylmethylsiloxane made by the Dow Corning Corporation), An example of a particularly preferred paraffin wax is Parrafin S.P. 434 (a paraffin wax made by Strahl and Pitsch Inc.); Cetearyl Alcohol (a mixed linear C₁₆-C₁₈ primary alcohol made by the Procter & Gamble Company under the name TA-1618); PEG 2000 (a polyethylene glycol having a MW of 2000 made by Sigma-Aldrich Corp). The weight percentages of these components are shown in Table IV below:

Table IV

Component	Weight %
WhiteProtopet® 1S	52
Polyphenylmethyl- siloxane	20
Paraffin Wax	15
Cetearyl Alcohol	10
PEG 2000	3

B. Preparation of Lotioned Tissue by Hot Melt Spraying

Lotion Composition D is placed into a heated tank operating at a temperature of 65°C. The composition is subsequently sprayed (using a Dynatec E84B1758 or Meltex EP45 or EP11 spray head, operating at a temperature of 76°C and an atomization pressure of 2.40 psig) onto the topsheet of a article in a 3.75 inch wide (article lateral direction) and 7 inch long (article longitudinal direction) area, the patch beginning 1 inch forward of the lateral centerline and extending toward the rear of the product. Add-on level = 12 g/m².

Of importance is how, at what angles and at what force or forces a web, either leg cuff web or topsheet web, for example, is contacted by a lotion applicator. Specifically, where a contact applicator, like a slot coat applicator, applies a skin care composition to a web herein, the applicator makes physical contact with the web. Such contact applicator will contact the web at a particular force and may move the web a distance from its original flow line. This phenomenon is illustrated in Figure 10 whereby the tip of a contact applicator 210 moves the web 1 away from its original web flow line 215 (Fig. 10B). At such moving, an entrance angle α and exit angle β are formed. The entrance angle α and exit angle β are measured from the perpendicular line 220 to the indented portion of the web 1 as is shown in Fig. 10B. The web 1 moves in the direction of the arrows.

The positioning of the contact applicator into a web 1 plays a crucial part in the performance of the skin care composition application performance. In practice, favorable entrance angles formed from contact with an applicator range from between about 30° to about 90°. Likewise, favorable exit angles formed from contact with an applicator range from between about 30° to about 90°.

The entrance and exit angles can affect how well lotion is transferred from a contact applicator to a web. Preferably, between about 80% to about 100% of the lotion applied from the contact applicator is transferred to a contacting web. More preferably about 90% to about 100% of the lotion applied from the contact applicator is transferred to a contacting web. Most preferably about 95% to about 100% % of the lotion applied

from the contact applicator is transferred to a contacting web. Correspondingly, the range of entrance and exit angles mentioned above provide the optimal angles at which a skin care composition will be applied from a contact applicator to a web.

In Fig. 10B, an insertion distance d is made into the web 1 by the force applied by the applicator 210 to the web 1. The insertion distance d is measured from the web's original line of flow 215 to its line of insertion 225. The forces applied by the applicator 210 to move the web 1 a distance d range from between about 1 ounce to about 100 pounds of applied force. This range of forces is important for maintaining uniform contact between the web 1 and the applicator 210. By the term "uniform contact" it is meant herein that a web herein will substantially, if not fully, remain in contact with an applicator during the period desired by a manufacturer without disruption of that contact.

Problems to avoid when contacting a web with a contact applicator are 1) transferring too little lotion from a contact applicator to a web such that lotion builds-up on the applicator itself possibly inhibiting lotion flow from the applicator and 2) transferring lotion to a web at such obtuse angles that lotion is re-transferred from the web to the applicator again which could possibly inhibit lotion flow from the applicator. This, of course, applies to any other skin care composition also.

In regards to the force applied by a contact applicator into a web, suitable forces of contact are required to ensure that the web will be contacted by the applicator regardless of any variances that may occur in a web. For example, where a web has a discontinuous profile, i.e., where some portions of the web are thicker than other portions, it is important to provide at least a minimum force of contact by the applicator to the web such that no matter the profile of the web, the web is being fully contacted as desired by a manufacturer. Also, where a web, because of the speed of its flow in a line, web inconsistencies, etc., might tend to bounce up away from an applicator, suitable forces of contact by an applicator are critical to ensuring that applied forces of contact thereof will exceed a web's tendency to move away from the applicator, thus ensuring a continuous application of lotion to a web as desired by a manufacturer.

In another embodiment herein, a device such as a back-up idler can be applied to a web from the opposite direction of the contact applicator (Fig. 11A). As is shown in Fig. 11A, the back-up idler 315 is applied from the opposite direction of the applicator 310 such that the web 1, by being sandwiched between the idler 315 and the applicator 310, is made to be continuously contacted as desired by a manufacturer. In this embodiment, the importance of entrance and exit angles in ensuring proper lotion application to a web may be reduced and some cases eliminated. That is, by using a back-up idler 315 a web 1 may be contacted by a contact applicator without moving the web out of its line of flow. Conversely, the web may be contacted by a contact applicator at angles that lie outside of the range given above, e.g., from about 90° to about 270° (Fig. 11B). It is noted herein that any suitable device for contacting a web herein with a contact applicator is within the contemplation of one skilled in the art.

Alternatively, as is shown in Fig. 11C, the web may extend between two points, (i.e., two idler rollers 315) with a contact applicator positioned therebetween. Generally, the web 1 is held taut (i.e., without any slack) or very nearly taut to cause an uninterrupted application of a skin care composition (e.g., lotion) on the web 1.

The Skin Care Composition

While the specific skin care composition(s) delivered (referred to herein as "skin care composition" and "composition") in accordance with the present invention is an important factor in delivering desirable skin effects, it is preferred that the skin care composition should provide a protective, nonocclusive function (e.g., a relatively liquid impervious but vapor pervious barrier) to avoid skin hyperhydration and skin exposure to materials contained in body exudates; an abrasion minimizing function to reduce skin irritation in the areas where the leg cuffs contact a wearer's skin; or contain agents that deliver, either directly or indirectly, skin care benefits. For example, indirect benefits include improved removal of skin irritants such as feces or urine. The composition may be in a variety of forms, including, but not limited to, emulsions, lotions, creams, ointments, salves, powders, suspensions, encapsulations, gels, and the like.

As used herein, the term "effective amount of a skin care composition" refers to an amount of a particular composition which, when applied or migrated to ("disposed on") the body surface of a leg cuff, will be effective in reducing the abrasion between the leg cuff and skin in the areas where the leg cuffs contact a wearer's skin, thereby providing a protective barrier and/or delivering a skin care benefit when delivered via leg cuffs, and/or reducing the adherence of BM to the skin. Unless otherwise indicated, the description pertaining to disposition of a skin care composition onto the leg cuffs will be applicable to compositions disposed on the topsheet, in such preferred embodiments. Of course, the effective amount of composition disposed on the leg cuff will depend, to a large extent, on the particular skin care composition used. Nonetheless, the quantity of the skin care composition disposed on at least a portion of the body surface of the leg cuff will preferably range from about 0.1 g/m^2 to about 500 g/m^2 , more preferably from about 1 g/m^2 to about 100 g/m^2 , still more preferably from about 5 g/m^2 to about 50 g/m^2 . These ranges are by way of illustration only and the skilled artisan will recognize that the nature of the composition will dictate the level that must be disposed thereon to achieve the desired skin care benefits, and that such levels are ascertainable by routine experimentation in light of the present disclosure.

While the level of skin care composition disposed on the leg cuffs is an important aspect of the present invention, more important is the amount of composition transferred to the wearer's skin during use of one or more of the treated leg cuffs. Though the requisite level delivered to the skin to provide the desired skin benefits will depend to some degree on the nature of the composition employed, Applicants have found that relatively low levels may be delivered while still providing the desired skin care benefits. This is particularly true for preferred compositions, such as those described in Example 1.

Another benefit of the present invention is the controlled application of the skin care composition to deliver the low but effective levels of, e.g., lotion required. This is in contrast to typically sporadic manual application of skin care agents, where the caregiver/user often applies significantly greater levels of material than are needed. Excessive materials added manually may adversely impact the fluid handling properties of the absorbent article, as a result of transfer from the skin to the article. Indeed, for certain materials, such as petrolatum, the levels applied manually may actually result in

an occlusive effect, thereby compromising the skin. A benefit of the present invention is providing a barrier to surface moisture while avoiding occlusion of the skin (i.e., maintaining skin breathability). Thus, the present methods, which allow controlled composition delivery throughout the wear period, allow transfer of optimal levels of the composition to the skin to maintain and/or improve skin health.

The method for determining the amount of skin care composition transferred to a wearer's skin after wearing one or more treated articles is described in the Test Methods section in U.S. Application No. 08/_____ entitled "A Method For Maintaining Or Improving Skin Health" filed on _____ and hereby incorporated by reference herein. With regard to the level of skin care composition that is transferred to the wearer during use of one treated absorbent article worn for a period of about 3 hours (a typical daytime wear time), particularly for preferred skin care compositions such as that described in Example 1, preferred is where at least about 0.01 mg/in² (0.0016 mg/cm²), more preferably at least about 0.05 mg/in² (0.0078 mg/cm²), still more preferably at least about 0.1 mg/in² (0.016 mg/cm²), of the composition is transferred to the skin over a three hour wear period. Typically, the amount of composition delivered by one treated article will be from about 0.01 mg/in² (0.0016 mg/cm²) to about 5 mg/in² (0.78 mg/cm²), more preferably from about 0.05 mg/in² (0.0078 mg/cm²) to about 3 mg/in² (0.47 mg/cm²), still more preferably from about 0.1 mg/in² (0.016 mg/cm²) to about 2 mg/in² (0.31 mg/cm²), over a three hour wear period.

Changes occur in accordance with normal use patterns, which typically include changes every 3 to 4 hours during the day and a fresh article before overnight sleep. For continual use of treated articles such as for a period of 24 hours, it will be preferred that at least about 0.03 mg/in² (0.0047 mg/cm²), more preferably at least about 0.1 mg/in² (0.016 mg/cm²), still more preferably at least about 0.3 mg/in² (0.047 mg/cm²), of the composition is transferred to the wearer's skin over the 24 hour period. Typically, the amount of composition delivered after a period of 24 hours where treated articles are applied at each change, will be from about 0.03 mg/in² (0.0047 mg/cm²) to about 18 mg/in² (2.79 mg/cm²), more typically from about 0.1 mg/in² (0.016 mg/cm²) to about 10 mg/in² (1.55 mg/cm²), still more typically from about 0.3 mg/in² (0.047 mg/cm²) to about 6 mg/in² (0.93 mg/cm²).

It will be recognized that of the numerous materials useful in the skin care compositions delivered to skin in accordance with the present invention, those that have been deemed safe and effective skin care agents are logical materials for use herein. Such materials include Category I actives as defined by the U.S. Federal Food and Drug Administration's (FDA) Tentative Final Monograph on Skin Protectant Drug Products for Over-the-Counter Human Use (21 C.F.R. § 347), which presently include: allantoin, aluminum hydroxide gel, calamine, cocoa butter, dimethicone, cod liver oil (in combination), glycerine, kaolin, petrolatum, lanolin, mineral oil, shark liver oil, white petrolatum, talc, topical starch, zinc acetate, zinc carbonate, zinc oxide, and the like. Other potentially useful materials are Category III actives as defined by the U.S. Federal Food and Drug Administration's Tentative Final Monograph on Skin Protectant Drug Products for Over-the-Counter Human Use (21 C.F.R. § 347), which presently include: live yeast cell derivatives, aldioxa, aluminum acetate, microporous cellulose, cholecalciferol, colloidal oatmeal, cysteine hydrochloride, dexpanthanol, Peruvian balsam oil, protein hydrolysates, racemic methionine, sodium bicarbonate, Vitamin A, and the like. It will be recognized that one or more of these optional materials may be used in combination with other ingredients, such as those described herein.

Many of the FDA monographed skin care ingredients are currently utilized in commercially available skin care products, such as A and D® Ointment, Vaseline® Petrolatum Jelly, Desitin® Diaper Rash Ointment and Daily Care® ointment, Gold Bond® Medicated Baby Powder, Aquaphor® Healing Ointment, Baby Magic® Baby Lotion, and Johnson's Ultra Sensitive® Baby Cream. These commercial products may be applied to absorbent articles to create treated articles for use in the present methods, either with or without modification of the product to facilitate delivery via this novel method.

As will be discussed hereinafter, the skin care compositions useful in the present invention preferably, though not necessarily, have a melting profile such that they are relatively immobile and localized on the wearer-contacting surface (body surface) of the leg cuff at room temperature, at least a portion of the composition will be transferable to a wearer's body at body temperature, and yet are not completely liquid under extreme storage conditions. Preferably, the compositions are easily transferable to the skin by way

of normal contact, wearer motion, and/or body heat. Because the composition preferably is substantially immobilized on the leg cuff's wearer-contacting surface, relatively low levels of a skin care composition are needed to impart the desired skin care benefits. In addition, special barrier or wrapping materials may be unnecessary in packaging the articles useful in the present invention.

A Lotion Composition

The lotion compositions of the present invention are solid, or more often semisolid, at 20°C, i.e., at ambient temperatures. By "semisolid" it is meant herein that the lotion composition has a rheology typical of pseudoplastic or plastic fluids. When no shear is applied, the lotion compositions can have the appearance of a semi-solid but can be made to flow as the shear rate is increased. This is due to the fact that, while the lotion composition contains primarily solid components, it also includes some minor liquid components. Preferably, the compositions of the present invention have a zero shear viscosity between about 1.0×10^6 centipoise and about 1.0×10^8 centipoise. More preferably, the zero shear viscosity is between about 5.0×10^6 centipoise and about 5.0×10^7 centipoise. As used herein the term "zero shear viscosity" refers to a viscosity measured at very low shear rates (e.g., 1.0 sec^{-1}) using plate and cone viscometer (a suitable instrument is available from TA Instruments of New Castle, DE as model number CSL 100). One of skill in the art will recognize means other than high melting point components (as discussed below) that can be used to provide comparable viscosities. Compositions comprising such means can be measured by extrapolating a plot of viscosity vs. shear rate for such compositions to a shear rate of zero at a temperature of about 20°C.

Preferred compositions are preferably at least semi-solid at room temperature to minimize composition migration. In addition, the compositions preferably have a final melting point (100% liquid) above potential "stressful" storage conditions that can be greater than 45°C (e.g., a warehouse in Arizona, car trunk in Florida, etc.). Representative compositions having these melt characteristics are described in detail in

U.S. Patent No. 5,643,588 (Roe, et al.), U.S. Patent No. 5,607,760 (Roe, et al.), U.S. Patent No. 5,609,587, and U.S. Patent No. 5,635,191, the disclosure of each of which is hereby incorporated by reference herein. Specifically, the lotion compositions of the present invention should have the following melt profile:

<u>Characteristic</u>	<u>Preferred Range</u>	<u>Most Preferred</u>
% liquid at room temp. (20 °C)	2-50	3-25
% liquid at body temp. (37 °C)	25-95	30-90
final melting point (°C)	≥38	≥45

By being solid or semisolid at ambient temperatures, preferred compositions do not have a tendency to flow and migrate to a significant degree to undesired locations of the article to which they are applied. This means less lotion composition is required for imparting desirable therapeutic or protective coating lotion benefits.

To enhance immobility of preferred compositions, the viscosity of the formulated compositions should be as high as possible to prevent flow from the leg cuff to undesired locations within the diaper. Unfortunately, in some instances, higher viscosities may inhibit transfer of a skin care composition to the wearer's skin or may be difficult to apply without processing problems. Therefore, a balance should be achieved so the viscosities are high enough to keep the skin care compositions localized on the body surface of the leg cuff, but not so high as to impede transfer to a wearer's skin. Suitable viscosities for the compositions will typically range from about 1 to about 5000 centipoise, preferably from about 5 to about 300 centipoise, more preferably from about 5 to about 100 centipoise, measured at 60°C using a rotational viscometer (a suitable viscometer is available from Lab Line Instruments, Inc. of Melrose Park, IL as Model 4537). The viscometer is operated at 60 rpm using a number 2 spindle.

An Emollient

For compositions designed to provide a skin care benefit, a useful active ingredient in these compositions is one or more skin protectants or emollients. As used herein, the term "emollient" is a material that protects against wetness or irritation, softens, soothes, supple, coats, lubricates, moisturizes, protects and/or cleanses the skin. (It will be recognized that several of the monographed actives listed above are "emollients", as that term is used herein.) In a preferred embodiment, these emollients will have either a plastic or liquid consistency at ambient temperatures, i.e., 20°C.

Representative emollients useful in the present invention include, but are not limited to, emollients that are petroleum-based; sucrose ester fatty acids; polyethylene glycol and derivatives thereof; humectants; fatty acid ester type; alkyl ethoxylate type; fatty acid ester ethoxylates; fatty alcohol type; polysiloxane type; propylene glycol and derivatives thereof; glycerine and derivatives thereof, including glyceride, acetoglycerides, and ethoxylated glycerides of C₁₂-C₂₈ fatty acids; triethylene glycol and derivatives thereof; spermaceti or other waxes; fatty acids; fatty alcohol ethers, particularly those having from 12 to 28 carbon atoms in their fatty chain, such as stearic acid; propoxylated fatty alcohols; other fatty esters of polyhydroxy alcohols; lanolin and its derivatives; kaolin and its derivatives; any of the monographed skin care agents listed above; or mixtures of these emollients.

Suitable petroleum-based emollients include those hydrocarbons, or mixtures of hydrocarbons, having chain lengths of from 16 to 32 carbon atoms. ~~Petroleum based~~ hydrocarbons having these chain lengths include mineral oil (also known as "liquid petrolatum") and petrolatum (also known as "mineral wax," "petroleum jelly" and "mineral jelly"). Mineral oil usually refers to less viscous mixtures of hydrocarbons having from 16 to 20 carbon atoms. Petrolatum usually refers to more viscous mixtures of hydrocarbons having from 16 to 32 carbon atoms. Petrolatum and mineral oil are particularly preferred emollients for compositions of the present invention.

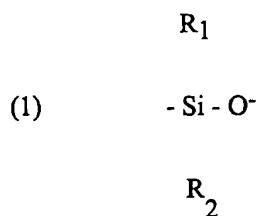
Suitable fatty acid ester type emollients include those derived from C₁₂-C₂₈ fatty acids, preferably C₁₆-C₂₂ saturated fatty acids, and short chain (C₁-C₈, preferably C₁-C₃) monohydric alcohols. Representative examples of such esters include methyl palmitate, methyl stearate, isopropyl laurate, isopropyl myristate, isopropyl palmitate,

ethylhexyl palmitate and mixtures thereof. Suitable fatty acid ester emollients can also be derived from esters of longer chain fatty alcohols (C₁₂-C₂₈, preferably C₁₂-C₁₆) and shorter chain fatty acids e.g., lactic acid, such as lauryl lactate and cetyl lactate.

Suitable alkyl ethoxylate type emollients include C₁₂-C₂₂ fatty alcohol ethoxylates having an average degree of ethoxylation of from about 2 to about 30. Preferably, the fatty alcohol ethoxylate emollient is selected from the group consisting of lauryl, cetyl, and stearyl ethoxylates, and mixtures thereof, having an average degree of ethoxylation ranging from about 2 to about 23. Representative examples of such alkyl ethoxylates include laureth-3 (a lauryl ethoxylate having an average degree of ethoxylation of 3), laureth-23 (a lauryl ethoxylate having an average degree of ethoxylation of 23), ceteth-10 (a cetyl alcohol ethoxylate having an average degree of ethoxylation of 10) and steareth-10 (a stearyl alcohol ethoxylate having an average degree of ethoxylation of 10). These alkyl ethoxylate emollients are typically used in combination with the petroleum-based emollients, such as petrolatum, at a weight ratio of alkyl ethoxylate emollient to petroleum-based emollient of from about 1:1 to about 1:5, preferably from about 1:2 to about 1:4.

Suitable fatty alcohol type emollients include C₁₂-C₂₂ fatty alcohols, preferably C₁₆-C₁₈ fatty alcohols. Representative examples include cetyl alcohol and stearyl alcohol, and mixtures thereof. These fatty alcohol emollients are typically used in combination with the petroleum-based emollients, such as petrolatum, at a weight ratio of fatty alcohol emollient to petroleum-based emollient of from about 1:1 to about 1:5, preferably from about 1:1 to about 1:2.

Other suitable types of emollients for use in the present invention include polysiloxane compounds. In general suitable polysiloxane materials for use in the present invention include those having monomeric siloxane units of the following structure:



wherein, R₁ and R₂, for each independent siloxane monomeric unit can each independently be hydrogen or any alkyl, aryl, alkenyl, alkaryl, arakyl, cycloalkyl, halogenated hydrocarbon, or other radicals. Any of such radicals can be substituted or unsubstituted. R₁ and R₂ radicals of any particular monomeric unit may differ from the corresponding functionalities of the next adjoining monomeric unit. Additionally, the polysiloxane can be either a straight chain, a branched chain or have a cyclic structure. The radicals R₁ and R₂ can additionally independently be other silaceous functionalities such as, but not limited to siloxanes, polysiloxanes, silanes, and polysilanes. The radicals R₁ and R₂ may contain any of a variety of organic functionalities including, for example, alcohol, carboxylic acid, phenyl, and amine functionalities.

Exemplary alkyl radicals are methyl, ethyl, propyl, butyl, pentyl, hexyl, octyl, decyl, octadecyl, and the like. Exemplary alkenyl radicals are vinyl, allyl, and the like. Exemplary aryl radicals are phenyl, diphenyl, naphthyl, and the like. Exemplary alkaryl radicals are toyl, xylyl, ethylphenyl, and the like. Exemplary aralkyl radicals are benzyl, alpha-phenylethyl, beta-phenylethyl, alpha-phenylbutyl, and the like. Exemplary cycloalkyl radicals are cyclobutyl, cyclopentyl, cyclohexyl, and the like. Exemplary halogenated hydrocarbon radicals are chloromethyl, bromoethyl, tetrafluorethyl, fluorethyl, trifluorethyl, trifluorotloyl, hexafluoroxylyl, and the like.

Viscosity of useful polysiloxanes may vary as widely as the viscosity of polysiloxanes in general vary, so long as the polysiloxane is flowable or can be made to be flowable for application to an absorbent article. This includes, but is not limited to, viscosity as low as 5 centistokes (at 37°C as measured by a glass viscometer) to about 20,000,000 centistokes. Preferably the polysiloxanes have a viscosity at 37°C ranging from about 5 to about 5,000 centistokes, more preferably from about 5 to about 2,000 centistokes, most preferably from about 100 to about 1000 centistokes. High viscosity polysiloxanes which themselves are resistant to flowing can be effectively deposited on the absorbent article by such methods as, for example, emulsifying the polysiloxane in surfactant or providing the polysiloxane in solution with the aid of a solvent, such as hexane, listed for exemplary purposes only. Particular methods for applying polysiloxane emollients to absorbent articles are discussed in more detail hereinafter.

Preferred polysiloxane compounds for use in the present invention are disclosed in U.S. Patent No. 5,059,282 (Ampulski, et al.), issued October 22, 1991, which is incorporated herein by reference. Particularly preferred polysiloxane compounds for use as emollients in the lotion compositions of the present invention include phenyl-functional polymethylsiloxane compounds (e.g., Dow Corning 556 Cosmetic-Grade Fluid: polyphenylmethylsiloxane), dimethicone compounds, and cetyl or stearyl functionalized dimethicones such as Dow 2502 and Dow 2503 polysiloxane fluids, respectively. In addition to such substitution with phenyl-functional or alkyl groups, effective substitution may be made with amino, carboxyl, hydroxyl, ether, polyether, aldehyde, ketone, amide, ester, and thiol groups. Of these effective substituent groups, the family of groups comprising phenyl, amino, alkyl, carboxyl, and hydroxyl groups are more preferred than the others; and phenyl-functional groups are most preferred.

Besides petroleum-based emollients, fatty acid ester emollients, fatty acid ester ethoxylates, alkyl ethoxylate emollients, fatty alcohol emollients, and polysiloxanes, the emollients useful in the present invention can include minor amounts (e.g., up to about 10% of the total emollient) of other, conventional emollients. These other conventional emollients include, but are not limited to propylene glycol, glycerine, triethylene glycol, spermaceti or other waxes, fatty acids, and fatty alcohol ethers having from between 12 to 28 carbon atoms in their fatty chain, such as stearic acid, propoxylated fatty alcohols; glycerides, acetoglycerides, and ethoxylated glycerides of C₁₂-C₂₈ fatty acids; other fatty esters of polyhydroxy alcohols; lanolin and its derivatives, and cod liver oil. These other emollients should be included in a manner such that the solid or semisolid characteristics of the lotion composition are maintained.

The amount of emollient that can be included in a lotion composition will depend on a variety of factors, including the particular emollient involved, the lotion-like benefits desired, the other components in the lotion composition and like factors. The lotion composition can comprise from about 10 to about 95% of the emollient. Preferably, the lotion composition comprises from about 20 to about 80%, most preferably from about 40 to about 75%, of the emollient.

An Immobilizing Agent

An especially key component of the lotion compositions of the present invention is an agent capable of immobilizing the emollient on the diaper leg cuff to which the lotion composition is applied. Because the emollient in the composition has a plastic or fluid consistency at 20°C, it tends to flow or migrate, even when subjected to modest shear. When applied to a part of an absorbent article such as a diaper leg cuff, especially in a melted or molten state, the emollient will not remain primarily on the surface of the leg cuff. Instead, the emollient may tend to migrate and flow into the interior of the diaper.

Specifically, if the emollient migrates into the interior of the diaper or other absorbent article, it can decrease the absorbency of the absorbent core due to the hydrophobic characteristics of many of the emollients used in the lotion compositions of the present invention. Also, migration of lotion through the leg cuff can cause an adverse effect on the sustained elasticity of the elastic gathers. It also means that much more emollient has to be applied to the diaper leg cuff to get the desired therapeutic or protective lotion benefits. Increasing the level of emollient not only increases the cost, but also exacerbates the undesirable effect on the absorbency of the diaper/absorbent article core, as well on the performance of the contracted or elastic gathers of a diaper.

The immobilizing agent counteracts this tendency of the emollient to migrate or flow by keeping the emollient primarily localized on the surface of the absorbent article to which the lotion composition is applied. This is believed to be due, in part, to the fact that the immobilizing agent raises the melting point of the lotion composition above that of the emollient. Since the immobilizing agent is also miscible with the emollient (or solubilized in the emollient with the aid of an appropriate emulsifier), it entraps the emollient on the surface of the absorbent article as well.

It is also advantageous to "lock" the immobilizing agent onto the surface of the absorbent article leg cuff. This can be accomplished by using immobilizing agents which quickly crystallize (i.e., solidify) at the surface of the absorbent article. In addition,

outside cooling of the treated absorbent article via blowers, fans, etc. can speed up crystallization of the immobilizing agent.

In addition to being miscible with (or solubilized in) the emollient, the immobilizing agent needs to have a melting point of at least about 35°C. This is so the immobilizing agent itself will not have a tendency to migrate or flow. Preferred immobilizing agents will have melting points of at least about 40°C. Typically, the immobilizing agent will have a melting point in the range of from about 50°C to about 150°C.

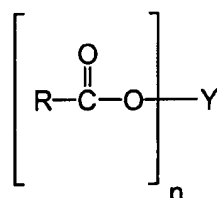
Suitable immobilizing agents for the present invention can comprise a member selected from the group preferably consisting of C₁₄-C₂₂ fatty alcohols, C₁₂-C₂₂ fatty acids, and C₁₂-C₂₂ fatty alcohol ethoxylates having an average degree of ethoxylation ranging from about 2 to about 30, and mixtures thereof. Preferred immobilizing agents include C₁₆-C₁₈ fatty alcohols, most preferably selected from the group consisting of cetyl alcohol, stearyl alcohol, and mixtures thereof. Mixtures of cetyl alcohol and stearyl alcohol are particularly preferred. Other preferred immobilizing agents include C₁₆-C₁₈ fatty acids, most preferably selected from the group consisting of palmitic acid, stearic acid, and mixtures thereof. Mixtures of palmitic acid and stearic acid are particularly preferred. Still other preferred immobilizing agents include C₁₆-C₁₈ fatty alcohol ethoxylates having an average degree of ethoxylation ranging from about 5 to about 20. Preferably, the fatty alcohols, fatty acids and fatty alcohols are linear.

Importantly, these preferred immobilizing agents such as the C₁₆ - C₁₈ fatty alcohols increase the rate of crystallization of the lotion causing the lotion to crystallize rapidly onto the surface of the substrate. Lower lotion levels can therefore be utilized or a superior lotion feel can be delivered. Traditionally, greater amounts of lotion were needed to generate softness because of the flow of these liquids into an article's absorbent core.

Other types of immobilizing agents can be used either alone or in combination with the fatty alcohols, fatty acids, and fatty alcohol ethoxylates described above. Examples of these other types of immobilizing agents include polyhydroxy fatty acid

esters, polyhydroxy fatty acid amides, and mixtures thereof. Preferred esters and amides will have three or more free hydroxy groups on the polyhydroxy moiety and are typically nonionic in character. Because of the possible skin sensitivity of those using a listed absorbent article herein (e.g., a diaper leg cuff or topsheet) to which the lotion composition is applied, these esters and amides should also be relatively mild and non-irritating to the skin.

Suitable polyhydroxy fatty acid esters for use in the present invention will have the formula:



wherein R is a C₅-C₃₁ hydrocarbyl group, preferably straight chain C₇-C₁₉ alkyl or alkenyl, more preferably straight chain C₉-C₁₇ alkyl or alkenyl, most preferably straight chain C₁₁-C₁₇ alkyl or alkenyl, or mixture thereof; Y is a polyhydroxyhydrocarbyl moiety having a hydrocarbyl chain with at least 2 free hydroxyls directly connected to the chain; and n is at least 1. Suitable Y groups can be derived from polyols such as glycerol, pentaerythritol; sugars such as raffinose, maltodextrose, galactose, sucrose, glucose, xylose, fructose, maltose, lactose, mannose and erythrose; sugar alcohols such as erythritol, xylitol, malitol, mannitol and sorbitol; and anhydrides of sugar alcohols such as sorbitan.

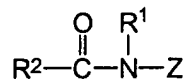
One class of suitable polyhydroxy fatty acid esters for use in the present invention comprises certain sorbitan esters, preferably the sorbitan esters of C₁₆-C₂₂ saturated fatty acids. Because of the manner in which they are typically manufactured, these sorbitan esters usually comprise mixtures of mono-, di-, tri-, etc. esters. Representative examples of suitable sorbitan esters include sorbitan palmitates (e.g., SPAN 40), sorbitan stearates

(e.g., SPAN 60), and sorbitan behenates, that comprise one or more of the mono-, di- and tri-ester versions of these sorbitan esters, e.g., sorbitan mono-, di- and tri-palmitate, sorbitan mono-, di- and tri-stearate, sorbitan mono-, di and tri-behenate, as well as mixed tallow fatty acid sorbitan mono-, di- and tri-esters. Mixtures of different sorbitan esters can also be used, such as sorbitan palmitates with sorbitan stearates. Particularly preferred sorbitan esters are the sorbitan stearates, typically as a mixture of mono-, di- and tri-esters (plus some tetraester) such as SPAN 60, and sorbitan stearates sold under the trade name GLYCOMUL-S by Lonza, Inc. Although these sorbitan esters typically contain mixtures of mono-, di- and tri-esters, plus some tetraester, the mono- and di-esters are usually the predominant species in these mixtures.

Another class of suitable polyhydroxy fatty acid esters for use in the present invention comprises certain glyceryl monoesters, preferably glyceryl monoesters of C₁₆-C₂₂ saturated fatty acids such as glyceryl monostearate, glyceryl monopalmitate, and glyceryl monobehenate. Again, like the sorbitan esters, glyceryl monoester mixtures will typically contain some di- and triester. However, such mixtures should contain predominantly the glyceryl monoester species to be useful in the present invention.

Another class of suitable polyhydroxy fatty acid esters for use in the present invention comprise certain sucrose fatty acid esters, preferably the C₁₂-C₂₂ saturated fatty acid esters of sucrose. Sucrose monoesters and diesters are particularly preferred and include sucrose mono- and di-stearate and sucrose mono- and di- laurate.

Suitable polyhydroxy fatty acid amides for use in the present invention will have the formula:



wherein R¹ is H, C₁-C₄ hydrocarbyl, 2-hydroxyethyl, 2-hydroxypropyl, methoxyethyl, methoxypropyl or a mixture thereof, preferably C₁-C₄ alkyl, methoxyethyl or

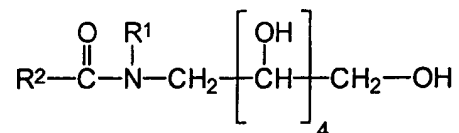
methoxypropyl, more preferably C₁ or C₂ alkyl or methoxypropyl, most preferably C₁ alkyl (i.e., methyl) or methoxypropyl; and R² is a C₅-C₃₁ hydrocarbyl group, preferably straight chain C₇-C₁₉ alkyl or alkenyl, more preferably straight chain C₉-C₁₇ alkyl or alkenyl, most preferably straight chain C₁₁-C₁₇ alkyl or alkenyl, or mixtures thereof; and Z is a polyhydroxyhydrocarbyl moiety having a linear hydrocarbyl chain with at least 3 hydroxyls directly connected to the chain. See U.S. Patent No. 5,174, 927 (Honsa), issued December 29, 1992 (herein incorporated by reference) which discloses these polyhydroxy fatty acid amides, as well as their preparation.

The Z moiety preferably will be derived from a reducing sugar in a reductive amination reaction; most preferably glycyl. Suitable reducing sugars include glucose, fructose, maltose, lactose, galactose, mannose, and xylose. High dextrose corn syrup, high fructose corn syrup, and high maltose corn syrup can be utilized, as well as the individual sugars listed above. These corn syrups can yield mixtures of sugar components for the Z moiety.

The Z moiety preferably will be selected from the group consisting of -CH₂-(CHOH)_n-CH₂OH, -CH(CH₂OH)-[(CHOH)_{n-1}]-CH₂OH, -CH₂OH-CH₂-(CHOH)₂(CHOR³)(CHOH)-CH₂OH, where n is an integer from 3 to 5, and R³ is H or a cyclic or aliphatic monosaccharide. Most preferred are the glycyls where n is 4, particularly -CH₂-(CHOH)₄-CH₂OH.

In the above formula, R¹ can be, for example, N-methyl, N-ethyl, N-propyl, N-isopropyl, N-butyl, N-2-hydroxyethyl, N-methoxypropyl or N-2-hydroxypropyl. R² can be selected to provide, for example, cocamides, stearamides, oleamides, lauramides, myristamides, capricamides, palmitamides, tallowamides, etc. The Z moiety can be 1-deoxyglucityl, 2-deoxyfructityl, 1-deoxymaltityl, 1-deoxylactityl, 1-deoxygalactityl, 1-deoxymannityl, 1-deoxymaltotriosityl, etc.

The most preferred polyhydroxy fatty acid amides have the general formula:



wherein R¹ is methyl or methoxypropyl; R² is a C₁₁-C₁₇ straight-chain alkyl or alkenyl group. These include N-lauryl-N-methyl glucamide, N-lauryl-N-methoxypropyl glucamide, N-cocoyl-N-methyl glucamide, N-cocoyl-N-methoxypropyl glucamide, N-palmityl-N-methoxypropyl glucamide, N-tallowyl-N-methyl glucamide, or N-tallowyl-N-methoxypropyl glucamide.

As has been previously noted, some of the immobilizing agents require an emulsifier for solubilization in the emollient. This is particularly the case for certain of the glucamides such as the N-alkyl-N-methoxypropyl glucamides having HLB values of at least about 7. Suitable emulsifiers will typically include those having HLB values below about 7. In this regard, the sorbitan esters previously described, such as the sorbitan stearates, having HLB values of about 4.9 or less have been found useful in solubilizing these glucamide immobilizing agents in petrolatum. Other suitable emulsifiers include steareth-2 (polyethylene glycol ethers of stearyl alcohol that conform to the formula CH₃(CH₂)₁₇(OCH₂CH₂)_nOH, where n has an average value of 2), sorbitan tristearate, isosorbide laurate, and glyceryl monostearate. The emulsifier can be included in an amount sufficient to solubilize the immobilizing agent in the emollient such that a substantially homogeneous mixture is obtained. For example, an approximately 1:1 mixture of N-cocoyl-N-methyl glucamide and petrolatum that will normally not melt into a single phase mixture, will melt into a single phase mixture upon the addition of 20% of a 1:1 mixture of Steareth-2 and sorbitan tristearate as the emulsifier.

Other types of ingredients that can be used as immobilizing agents, either alone, or in combination with the above-mentioned immobilizing agents, include waxes such as carnauba, beeswax, candelilla, paraffin, ceresin, esparto, ouricuri, rezowax, and other known waxes. Preferably the wax is a paraffin wax. An example of a particularly

preferred paraffin wax is Parrafin S.P. 434 from Strahl and Pitsch Inc. P.O. Box 1098 West Babylon, NY 11704.

The amount of immobilizing agent that should be included in the lotion compositions will depend on a variety of factors, including the particular emollient involved, the particular immobilizing agent involved, whether an emulsifier is required to solubilize the immobilizing agent in the emollient, the other components in the lotion composition and like factors. The lotion composition can comprise from about 5 to about 90% of the immobilizing agent. Preferably, the lotion composition comprises from about 5 to about 50%, most preferably from about 10 to about 40%, of the immobilizing agent.

An Optional Hydrophilic Surfactant

Of course, it is highly desirable that at least a portion of an absorbent article's topsheet herein be made of a hydrophilic material to promote rapid transfer of liquids (e.g., urine) through the topsheet. Similarly, it may be desirable that the composition be sufficiently wettable to ensure that liquids will transfer through the topsheet rapidly. Alternatively, hydrophobic skin care composition may be utilized, so long as they are applied such that the fluid handling properties of the topsheet are adequately maintained. (For example, as discussed below, nonuniform application of the composition to the topsheet is one means to accomplish this goal.) This diminishes the likelihood that body exudates will flow off the composition-topsheet rather than being drawn through the topsheet and absorbed by the absorbent core. Where a hydrophilic composition is desired, depending upon the particular components used in the composition, a hydrophilic surfactant (or a mixture of hydrophilic surfactants) may, or may not, be required to improve wettability. For example, some immobilizing agents, such as N-cocoyl-N-methoxypropyl glucamide have HLB values of at least about 7 and are sufficiently wettable without the addition of a hydrophilic surfactant. Other immobilizing agents such as the C₁₆ - C₁₈ fatty alcohols having HLB values below about 7 will require the addition of a hydrophilic surfactant to improve wettability when the composition is applied to article topsheets. Similarly, a hydrophobic emollient such as petrolatum will

require the addition of a hydrophilic surfactant if a hydrophilic composition is desired. Of course, the concern about wettability is not a factor when the body contacting surface under consideration is other than the article's topsheet or when fluid handling properties of the topsheet are adequately maintained by other means (e.g., nonuniform application).

Suitable hydrophilic surfactants will preferably be miscible with the other components of the skin care composition so as to form homogeneous mixtures. Because of possible skin sensitivity of those using disposable absorbent products to which the composition is applied, these surfactants should also be relatively mild and non-irritating to the skin. Typically, these hydrophilic surfactants are nonionic, are non-irritating to the skin, and avoid other undesirable effects on any other structures within the treated article; e.g., reductions in tissue laminate tensile strength, adhesive bond sufficiencies, and the like.

Suitable nonionic surfactants may be substantially nonmigratory after the lotion composition is applied to the absorbent article and will typically have HLB values in the range of from about 4 to about 20, preferably from about 7 to about 20. To be nonmigratory, these nonionic surfactants will typically have melt temperatures greater than the temperatures commonly encountered during storage, shipping, merchandising, and use of disposable absorbent products, e.g., at least about 30°C. In this regard, these nonionic surfactants will preferably have melting points similar to those of the immobilizing agents previously described.

Suitable nonionic surfactants for use in skin care compositions of the present invention include alkylglycosides; alkylglycoside ethers as described in U.S. Patent No. 4,011,389 (Langdon, et al), issued March 8, 1977; alkylpolyethoxylated esters such as Pegosperse 1000MS (available from Lonza, Inc., Fair Lawn, New Jersey), ethoxylated sorbitan mono-, di- and/or tri-esters of C₁₂-C₁₈ fatty acids having an average degree of ethoxylation of from about 2 to about 20, preferably from about 2 to about 10, such as TWEEN 60 (sorbitan esters of stearic acid having an average degree of ethoxylation of about 20) and TWEEN 61 (sorbitan esters of stearic acid having an average degree of ethoxylation of about 4), and the condensation products of aliphatic alcohols with from about 1 to about 54 moles of ethylene oxide. The alkyl chain of the aliphatic alcohol is

typically in a straight chain (linear) configuration and contains from about 8 to about 22 carbon atoms. Particularly preferred are the condensation products of alcohols having an alkyl group containing from about 11 to about 22 carbon atoms with from about 2 to about 30 moles of ethylene oxide per mole of alcohol. Examples of such ethoxylated alcohols include the condensation products of myristyl alcohol with 7 moles of ethylene oxide per mole of alcohol, the condensation products of coconut alcohol (a mixture of fatty alcohols having alkyl chains varying in length from 10 to 14 carbon atoms) with about 6 moles of ethylene oxide. A number of suitable ethoxylated alcohols are commercially available, including TERGITOL 15-S-9 (the condensation product of C₁₁-C₁₅ linear alcohols with 9 moles of ethylene oxide), marketed by Union Carbide Corporation; KYRO EOB (condensation product of C₁₃-C₁₅ linear alcohols with 9 moles of ethylene oxide), marketed by The Procter & Gamble Co., the NEODOL brand name surfactants marketed by Shell Chemical Co., in particular NEODOL 25-12 (condensation product of C₁₂-C₁₅ linear alcohols with 12 moles of ethylene oxide) and NEODOL 23-6.5T (condensation product of C₁₂-C₁₃ linear alcohols with 6.5 moles of ethylene oxide that has been distilled (topped) to remove certain impurities), and especially the PLURAFAC brand name surfactants marketed by BASF Corp., in particular PLURAFAC A-38 (a condensation product of a C₁₈ straight chain alcohol with 27 moles of ethylene oxide). (Certain of the hydrophilic surfactants, in particular ethoxylated alcohols such as NEODOL 25-12, can also function as alkyl ethoxylate emollients). Other examples of preferred ethoxylated alcohol surfactants include ICI's class of Brij surfactants and mixtures thereof, with Brij 72 (i.e., Steareth-2) and Brij 76 (i.e., Steareth-10) being especially preferred. Also, mixtures of cetyl alcohol and stearyl alcohol ethoxylated to an average degree of ethoxylation of from about 10 to about 20 may also be used as the hydrophilic surfactant.

Another type of suitable surfactant for use in the skin care composition includes Aerosol OT, a dioctyl ester of sodium sulfosuccinic acid marketed by American Cyanamid Company.

Still another type of suitable surfactant for use in the present invention includes silicone copolymers such as General Electric SF 1188 (a copolymer of a polydimethylsiloxane and a polyoxyalkylene ether) and General Electric SF 1228 (a

silicone polyether copolymer). These silicone surfactants can be used in combination with the other types of hydrophilic surfactants discussed above, such as the ethoxylated alcohols. These silicone surfactants have been found to be effective at concentrations as low as 0.1%, more preferably from about 0.25 to about 1.0%, by weight of the lotion composition.

Where a hydrophilic composition is desired, the amount of hydrophilic surfactant required to increase the wettability of the composition to a desired level will depend in-part upon the HLB value and level of immobilizing agent, if any, used, the HLB value of the surfactant used and like factors. The composition can comprise from about 0.1 to about 50% of the hydrophilic surfactant when needed to increase the wettability properties of the composition. Preferably, the composition comprises from about 1 to about 25%, most preferably from about 10 to about 20%, of the hydrophilic surfactant when needed to increase wettability.

Other Optional Components

Skin care compositions can comprise other optional components typically present in emollient, creams, and lotions of this type. These optional components include water, viscosity modifiers, perfumes, disinfectant antibacterial actives, pharmaceutical actives, film formers, vitamins (e.g., vitamin E), deodorants, opacifiers, astringents, solvents, alcohols and the like. Materials such as zinc oxide, calamine, and allantoin can also be used to help protect the skin from irritation, e.g., diaper rash. In addition, stabilizers can be added to enhance the shelf life of the skin care composition such as cellulose derivatives, proteins and lecithin. All of these materials are well known in the art as additives for such formulations and can be employed in appropriate amounts in the skin care compositions of the present invention. In addition, aloe extract in amounts from about 0.1% to about 20% by weight is a preferred optional component for the skin care components disclosed herein.

If water-based skin care compositions are used, a preservative will be needed. Suitable preservatives include propyl paraben, methyl paraben, benzyl alcohol, benzylkonium, tribasic calcium phosphate, BHT, or acids such as citric, tartaric, maleic,

lactic, malic, benzoic, salicylic, and the like. Suitable viscosity increasing agents include some of the agents described as effective immobilizing agents. Other suitable viscosity increasing agents include alkyl galactomannan, silica, talc, magnesium silicate, sorbitol, colloidal silicone dioxide, magnesium aluminum silicate, zinc stearate, wool wax alcohol, sorbiton, sesquioleate, cetyl hydroxy ethyl cellulose and other modified celluloses. Suitable solvents include propylene glycol, glycerine, cyclomethicone, polyethylene glycols, hexalene glycol, diol and multi-hydroxy based solvents. Suitable vitamins include A, D-3, E, B-5 and E acetate.

The Absorbent Article

As used herein, the term "absorbent article" refers to devices which absorb, remove and/or contain body exudates, and more specifically, refers to devices which are placed against the skin of a wearer to absorb and contain the various exudates discharged from the body (e.g., diapers, sanitary napkins, wipes, interlabial products, tampons, and incontinent devices). The term "disposable" is used herein to describe absorbent articles which are not intended to be laundered or otherwise restored or reused as an absorbent article after a single use. Examples of disposable absorbent articles include feminine hygiene garments such as sanitary napkins and panty-liners, diapers, incontinence briefs, diaper holders, training pants, and the like.

Disposable absorbent articles typically comprise a liquid pervious topsheet, a liquid impervious backsheet joined to the topsheet and an absorbent core positioned between the topsheet and the backsheet. Disposable absorbent articles and components thereof, including the topsheet, backsheet, absorbent core, and any individual layers of these components, have a body surface and a garment surface. As used herein, "body surface", "body facing" or "body contacting surface" means that a surface of the article or component which is intended to be worn toward or adjacent to the body of the wearer, while the "garment surface" is on the opposite side that faces away from the wearer and is oriented toward the wearer's undergarments when the disposable absorbent article is worn.

The following description generally discusses the absorbent core, topsheet, and backsheet materials that are useful in disposable absorbent articles. It is to be understood that this general description applies to these components of the specific absorbent articles shown in Figures 1-4 and further described below, in addition to those of other disposable absorbent articles which are generally described herein.

In general, the absorbent core is capable of absorbing or retaining liquids (e.g., menses, urine, and/or other body exudates). The absorbent core is preferably compressible, conformable, and non-irritating to a wearer's skin. The absorbent core may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, oval, hourglass, "T" shaped, dog bone, symmetric, asymmetric, etc.). In addition to the absorbent composites of the present invention, the absorbent core may include any of a wide variety of liquid-absorbent materials commonly used in absorbent articles, such as comminuted wood pulp, which is generally referred to as airfelt. Examples of other suitable absorbent materials for use in the absorbent core include creped cellulose wadding; meltblown polymers including coform; chemically stiffened, modified or cross-linked cellulosic fibers; synthetic fibers such as crimped polyester fibers; peat moss; tissue including tissue wraps and tissue laminates; absorbent foams; absorbent sponges; superabsorbent polymers; absorbent gelling materials; or any equivalent material or combinations of materials, or mixtures of these.

The configuration and construction of the absorbent core may also be varied (e.g., the absorbent core may have varying caliper zones and/or have a profile so as to be thicker in the center; hydrophilic gradients; gradients of the absorbent composite of the present invention, superabsorbent gradients; or lower average density and lower average basis weight zones, e.g., acquisition zones; or may comprise one or more layers or structures). The total absorbent capacity of the absorbent core should, however, be compatible with the design loading and the intended use of the absorbent article. Further, the size and absorbent capacity of the absorbent core may be varied to accommodate different uses such as diapers, incontinence pads, pantliners, regular sanitary napkins, and overnight sanitary napkins, and to accommodate wearers ranging from infants to adults.

The absorbent core can include other absorbent components that are often used in absorbent articles, for example, a dusting layer, a wicking or acquisition layer, or a secondary topsheet for increasing a wearer's comfort.

The topsheet is preferably compliant, soft feeling, and non-irritating to a wearer's skin. Further, the topsheet is liquid pervious, permitting liquids (e.g., menses and/or urine) to readily penetrate through its thickness. A suitable topsheet may be manufactured from a wide range of materials such as woven and nonwoven materials (e.g., a nonwoven web of fibers); polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films; porous foams; reticulated foams; reticulated thermoplastic films; and thermoplastic scrims. Suitable woven and nonwoven materials can comprise natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polymeric fibers such as polyester, polypropylene, or polyethylene fibers) or a combination of natural and synthetic fibers. When the topsheet comprises a nonwoven web, the web may be manufactured by a wide number of known techniques. For example, the web may be spunbonded, carded, wet-laid, melt-blown, hydroentangled, combinations of the above, or the like.

The backsheet is preferably impervious to liquids (e.g., menses and/or urine), at least in the crotch region of the absorbent article, and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials may also be used. As used herein, the term "flexible" refers to materials which are compliant and will readily conform to the general shape and contours of the human body. The backsheet prevents the exudates absorbed and contained in the absorbent core from wetting articles which contact the absorbent article such as bedsheets, pants, pajamas and undergarments. The backsheet may thus comprise a woven or nonwoven material, polymeric films such as thermoplastic films of polyethylene or polypropylene, or composite materials such as a film-coated nonwoven material. A suitable backsheet is a polyethylene film having a thickness of from about 0.012 mm (0.5 mil) to about 0.051 mm (2.0 mils). Exemplary polyethylene films are manufactured by Clopay Corporation of Cincinnati, Ohio, under the designation P18-1401 and by Tredegar Film Products of Terre Haute, Indiana, under the designation XP-39385. The backsheet is preferably embossed and/or matte finished to provide a more clothlike appearance. Further, the backsheet may permit vapors to

escape from the absorbent core (i.e., the backsheet is breathable) while still preventing exudates from passing through the backsheet. The size of the backsheet is dictated by the size of the absorbent core and the exact absorbent article design selected.

The backsheet and the topsheet are positioned adjacent the garment surface and the body surface, respectively, of the absorbent core. The absorbent core is preferably joined with the topsheet, the backsheet, or both in any manner as is known by attachment means (not shown in Figure 3) such as those well known in the art. However, embodiments of the present invention are envisioned wherein portions of the entire absorbent core are unattached to either the topsheet, the backsheet, or both.

For example, the backsheet and/or the topsheet may be secured to the absorbent core or to each other by a uniform continuous layer of adhesive, a patterned layer of adhesive, or an array of separate lines, spirals, or spots of adhesive. Adhesives which have been found to be satisfactory are manufactured by H. B. Fuller Company of St. Paul, Minnesota under the designation HL-1258 or H-2031. Polybutelene adhesives are also particularly desired for use as an adhesive herein. The attachment means will preferably comprise an open pattern network of filaments of adhesive as is disclosed in U.S. Patent No. 4,573,986, issued to Minetola, et al. on March 4, 1986, and which is incorporated herein by reference. An exemplary attachment means of an open pattern network of filaments comprises several lines of adhesive filaments swirled into a spiral pattern such as illustrated by the apparatus and method shown in U.S. Patent No. 3,911,173 issued to Sprague, Jr. on October 7, 1975; U.S. Patent No. 4,785,996 issued to Zwieker, et al. on November 22, 1978; and U.S. Patent No. 4,842,666 issued to Werenicz on June 27, 1989. Each of these patents are hereby incorporated by reference herein. Alternatively, the attachment means may comprise heat bonds, pressure bonds, ultrasonic bonds, dynamic mechanical bonds, or any other suitable attachment means or combinations of these attachment means as are known in the art.

A preferred disposable absorbent article on which the skin care composition is applied are diapers. As used herein, the term "diaper" refers to an absorbent article generally worn by infants, and incontinent persons that is worn about the lower torso of the wearer. In other words, the term "diaper" includes infant diapers, training pants, adult

incontinence devices, etc. The present invention is also applicable to other types of disposable products such as sanitary napkins and panty liners.

Figure 1 is a plan view of a preferred embodiment of the diaper 20 of the present invention in its flat-out, uncontracted state (i.e., with all elastic induced contraction pulled out) with portions of the structure being cut away to more clearly show the construction of the diaper 20 and with the portion of the diaper 20 which contacts the wearer facing the viewer. The diaper 20 is shown in Figure 1 to have a front waist region 22, a back waist region 24, a crotch region 26 and a periphery 28 which is defined by the outer edges of the diaper in which the longitudinal edges are designated 30 and the end edges are designated 32. The diaper 20 additionally has a lateral centerline which is designated 34 and a longitudinal centerline which is designated 36. The diaper 20 comprises a liquid pervious topsheet 38, the top surface of the topsheet 38 being designated 40; a liquid impervious backsheet 42; an absorbent core 44 having side edges 46 and comprising an absorbent layer 48 and first and second tissue layers 50 and 52, respectively; a pair of tape-tab fasteners 54; gasketing leg cuffs 56 each comprising a side flap 58 and flap elastic members 60; barrier leg cuffs 62 each having a proximal edge 64, a distal edge 66, an inner surface 68, an outer surface 70, a first end 72 and a second end 74; and spacing means 76 such as spacing elastic member 77 for spacing the distal edge 66 away from the topsheet top surface 40. The diaper 20 additionally comprises adhesive means 78 such as a glue bead 79 for securing closed the first and second ends 72 and 74 of each barrier leg cuff 62. The areas in which the adhesive means 78 are disposed are designated front closure zone 80 and back closure zone 82. While the topsheet 38, the absorbent core 44, the backsheet 42, and the elastically contractible gasketing leg cuffs 56 may be assembled in a variety of well known configurations, a preferred diaper configuration is described generally in U.S. Patent No. 3,860,003 entitled "Contractable Side Portions for Disposable Diaper", which issued to K. B. Buell on January 14, 1975, such patent being incorporated by reference herein.

The diaper 20 is shown in Figure 1 to have an outer surface 86, and an inner surface 84 opposed to the outer surface 86. The inner surface 84 of the diaper 20 comprises that portion of the diaper 20 which is positioned adjacent to the wearer's body during use (i.e., the inner surface 84 generally is formed by at least a portion of the

topsheet 38 and other components that may be joined to the topsheet 38). The outer surface 86 comprises that portion of the diaper 20 which is positioned away from a wearer's body (i.e., the outer surface 86 generally is formed by at least a portion of the backsheet 42 and other components that may be joined to the backsheet 42). As used herein, the portion of the diaper 20 or component thereof which faces the wearer is also referred to as the body facing surface. Similarly, the portion facing away from the wearer is also referred to herein as the garment facing surface.

Figure 1 shows a preferred embodiment of the diaper 20 in which the topsheet 38 and the backsheet 42 are coextensive and have length and width dimensions generally larger than those of the absorbent core 44. The topsheet 38 is associated with and superposed on the backsheet 42 to thereby form the periphery 28 of the diaper 20.

The diaper 20 has front and back waist regions 22 and 24 extending, respectively, from the end edges 32 of the diaper periphery 28 toward the lateral centerline 34 of the diaper 20 a distance from about 1/4 to about 1/3 the length of the diaper 20. The waist regions comprise those portions of the diaper 20 which, when worn, encircle the waist of the wearer. The crotch region 26 is that portion of the diaper 20 between the waist regions 22 and 24, and comprises that portion of the diaper 20 which, when worn, is positioned between the legs of the wearer and covers the lower torso of the wearer.

Figure 2 is a fragmentary sectional view taken along line 2--2 of Figure 1 and depicts the diaper construction in the back waist region 24 of the diaper 20. (It should be understood that the diaper construction in the front waist region 22 is identical to the construction in the back waist region 24.) The absorbent core comprises the absorbent layer 48 that is shown as being completely enveloped by the first and second tissue layers 50 and 52. The absorbent core 44 is disposed between the topsheet 38 and the backsheet 42; both the topsheet 38 and the backsheet 42 extend beyond the side edge 46 of the absorbent core 44 to define the side flap 58. The juxtaposed areas of the topsheet 38 and the backsheet 42 are adhesively secured together by adhesive 88. In a preferred embodiment, the flap elastic members 60 do not extend into the front waist region 22 so that the gasketing leg cuff 56 is not formed in this region. The barrier leg cuff 62 is shown as being a separate element secured to the topsheet 38; the proximal edge 64 being

formed by securing the element to the topsheet 38 by adhesive 92. The inner surface 68 of the barrier leg cuff 62 (also referred to herein as the barrier leg cuff's inboard surface) is secured to the topsheet top surface 40 by adhesive means 78 such as the glue bead 79. Therefore, the distal edge 66 is closed. (i.e., it is not spaced away from the topsheet top surface 40). It should be noted that the spacing elastic member 77 is not disposed in this region because the distal edge 66 is not designed to be spaced away from the topsheet top surface 40 in the waist regions. Therefore, the barrier leg cuff 62 is not open nor ready to constrain the flow of body exudates in this region.

Figure 3 is a fragmentary sectional view taken along line 3--3 of Figure 1 and depicts the diaper construction in the crotch region 26 of the diaper 20 as it is shaped before being applied to the wearer (i.e., the diaper 20 is subjected to elastic contraction). The absorbent core 44 comprises the absorbent layer 48 that is shown as being completely enveloped by the first and second tissue layers 50 and 52. The absorbent core 44 is disposed between the topsheet 38 and the backsheet 42; both the topsheet 38 and the backsheet 42 extend beyond the side edge 46 of the absorbent core 44 to define the side flap 58. The juxtaposed areas of the topsheet 38 and the backsheet 42 are adhesively secured together by adhesive 88. The topsheet 38 and the backsheet 42 also enclose the flap elastic members 60 adjacent the longitudinal edge 30 in the periphery 28. The flap elastic members 60 are secured in the topsheet-backsheet formed side flap 58 by elastic attachment means 90. The elastically contractible gasketing leg cuff 56 is thereby formed by the side flap 58 and the flap elastic members 60. The gasketing leg cuff has a front surface 57 oriented toward the skin of the wearer when the diaper is worn, and a back surface 59 opposed to the front surface. The barrier leg cuff 62 is shown as being formed by securing an element to the topsheet 38 between the flap elastic members 60 and the side edge 46 of the absorbent core 44. The proximal edge 64 of the barrier leg cuff 62 is formed by securing the barrier leg cuff element to the topsheet 38 by adhesive 92. The spacing elastic members 77 are enclosed in a tunnel that is formed when an end of the barrier leg cuff element is folded back upon itself; the spacing elastic members 77 being secured in the barrier leg cuff 62 by elastic attachment means 94. The distal edge 66 of the barrier leg cuff 62 is spaced away from the topsheet top surface 40 by the elastic gathering action of the spacing elastic members 77; a channel 96 thereby being formed by at least the

proximal edge 64, the distal edge 66 and the inboard surface 68 of the barrier leg cuff 62. The channel 96 is shown as being ready to restrain, contain and hold body exudates until the diaper 20 is removed from the wearer.

Diapers of the present invention can have a number of well known configurations, with the absorbent cores thereof being adapted to the present invention. Exemplary configurations are described generally in U.S. Patent No. 3,860,003 issued to Buell on January 14, 1975; U.S. Patent No. 5,151,092 issued to Buell et al. on September 29, 1992; U.S. Patent No. 5,221,274 issued to Buell et al. on June 22, 1993. Each of these patents is hereby incorporated by reference herein.

A topsheet 38 which is particularly suitable for use in the diaper 20, is carded and thermally bonded by means well known to those skilled in the fabrics art. A satisfactory topsheet for the present invention comprises staple length polypropylene fibers having a denier of about 2.2. As used herein, the term "staple length fibers" refers to those fibers having a length of at least about 15.9 mm (0.625 inches). Preferably, the topsheet has a basis weight from about 14 to about 25 grams per square meter (g/m²). A suitable topsheet is manufactured by Veratec, Inc., a Division of International Paper Company, of Walpole, Mass. under the designation P-8.

The topsheet 38 of diaper 20 is preferably made of a hydrophilic material to promote rapid transfer of liquids (e.g., urine) through the topsheet. If the topsheet is made of a hydrophobic material, preferably at least the upper surface of the topsheet is treated to be hydrophilic so that liquids will transfer through the topsheet more rapidly. This diminishes the likelihood that body exudates will flow off the topsheet rather than being drawn through the topsheet and being absorbed by the absorbent core. The topsheet can be rendered hydrophilic by treating it with a surfactant. Suitable methods for treating the topsheet with a surfactant include spraying the topsheet material with the surfactant and immersing the material into the surfactant. A more detailed discussion of such a treatment and hydrophilicity is contained in U.S. Patent No. 4,988,344 entitled "Absorbent Articles with Multiple Layer Absorbent Layers" issued to Reising, et al on January 29, 1991 and U.S. Patent No. 4,988,345 entitled "Absorbent Articles with Rapid

"Acquiring Absorbent Cores" issued to Reising on January 29, 1991; each patent is incorporated by reference herein.

In a preferred embodiment of a diaper as described herein, the backsheet 42 has a modified hourglass shape extending beyond the absorbent core a minimum distance of about 1.3 cm to about 6.4 cm (about 0.5 to about 2.5 inch) around the entire diaper periphery.

The absorbent core 44 may take on any size or shape that is compatible with the diaper 20. One preferred embodiment of the diaper 20 has an asymmetric, modified T-shaped absorbent core 44 having ears in the first waist region but a generally rectangular shape in the second waist region. Exemplary absorbent structures for use as the absorbent core of the present invention that have achieved wide acceptance and commercial success are described in U.S. Patent No. 4,610,678 entitled "High-Density Absorbent Structures" issued to Weisman et al. on September 9, 1986; U.S. Patent No. 4,673,402 entitled "Absorbent Articles With Dual-Layered Cores" issued to Weisman et al. on June 16, 1987; U.S. Patent No. 4,888,231 entitled "Absorbent Core Having A Dusting Layer" issued to Angstadt on December 19, 1989; and U.S. Patent No. 4,834,735, entitled "High Density Absorbent Members Having Lower Density and Lower Basis Weight Acquisition Zones", issued to Alemany, et al. on May 30, 1989. The absorbent core may further comprise the dual core system containing an acquisition/distribution core of chemically stiffened fibers positioned over an absorbent storage core as detailed in U.S. Patent No. 5,234,423, entitled "Absorbent Article With Elastic Waist Feature and Enhanced Absorbency" issued to Alemany et al., on August 10, 1993; and in U.S. Patent No. 5,147,345, entitled "High Efficiency Absorbent Articles For Incontinence Management" issued to Young, et al. on September 15, 1992. All of the above-foregoing patents are hereby incorporated by reference herein.

In a preferred embodiment, the diaper 20 comprises elasticized barrier leg cuffs 62 and elasticized gasketing leg cuffs 56 for providing improved containment of liquids and other body exudates; and a fastening system 54 which forms a side closure which maintains the front waist region 22 and the back waist region 24 in an overlapping configuration such that lateral tensions are maintained around the circumference of the

diaper to maintain the diaper on the wearer. The diaper 20 may also comprise an elastic waist feature (not shown) and/or elasticized side panels (not shown) in the waist regions 22 and 24 to provide a more comfortable and contouring fit and more effective application of the diaper 20.

The elasticized leg cuffs herein are constructed to provide improved containment of liquid and other body exudates and may be constructed in a number of different configurations, including those described in U.S. Patent No. 3,860,003; U.S. Patent No. 4,909,803, issued to Aziz et al. on Mar. 20, 1990; U.S. Patent No. 4,695,278, issued to Lawson on Sept. 22, 1987; and U.S. Patent No. 4,795,454, issued to Dragoo on Jan. 3, 1989, each of these patents being hereby incorporated by reference herein. Each elasticized leg cuff may comprise several different embodiments for reducing the leakage of body exudates in the leg regions. (The leg cuff can be and is sometimes also referred to as leg bands, side flaps, barrier leg cuffs, or elastic leg cuffs.) U.S. Patent No. 3,860,003, incorporated herein by reference, describes a disposable diaper which provides a contractible leg opening having a side flap and one or more elastic members to provide an elasticized gasketing leg cuff. U.S. Patent No. 4,909,803 entitled "Disposable Absorbent Article Having Elasticized Flaps" issued to Aziz et al. on March 20, 1990, and incorporated herein by reference, describes a disposable diaper having "stand-up" elasticized flaps (barrier leg cuffs) to improve the containment of the leg regions. U.S. Patent No. 4,695,278 entitled "Absorbent Article Having Dual Leg cuffs" issued to Lawson on September 22, 1987, and incorporated herein by reference, describes a disposable diaper having dual leg cuffs including a gasketing leg cuff and a barrier leg cuff. While each elasticized leg cuff may be configured so as to be similar to any of the leg bands, side flaps, barrier leg cuffs, or elastic leg cuffs described above, it is preferred that the elasticized leg cuff comprise barrier leg cuffs 62 and gasketing leg cuffs 56 as described in detail below.

Preferably, each barrier leg cuff 62 is a flexible member having a proximal edge 64, a distal edge 66, an inner surface 68 (also referred to herein as the inboard surface) and an outer surface 70 (also referred to herein as the outboard surface). The inner surface 68 is oriented toward the interior of the diaper, and the outer surface 70 is oriented toward the skin of a wearer when the diaper is being worn. As used herein, the term "flexible" refers

to materials which are compliant and which will readily conform to the general shape and contours of a wearer's body. The barrier leg cuff 62 may be manufactured from a wide variety of materials such as polypropylene, polyester, rayon, nylon, foams, plastic films, formed films, and elastic foams. A number of manufacturing techniques may be used to manufacture a barrier leg cuff. For example, a barrier leg cuff herein may be woven, non-woven, spunbonded, spunbonded meltblown, carded, coated, laminated, a combination of these or the like. A particularly preferred barrier leg cuff 62 comprises a polypropylene material containing no finish or surfactant to render it liquid impermeable. A particularly preferred polypropylene material is manufactured by Crown Zellerbach Company as Celestra. In addition, because of the hydrophobic skin care coatings of the present invention, the barrier leg cuffs herein may be made from hydrophilic material.

As shown in Figures 1 and 3, the barrier leg cuff 62, and more particularly the proximal edge 64, is disposed adjacent to the diaper longitudinal side edge 30, inboard of and preferably adjacent to the gasketing leg cuff 56. The term "inboard" is defined as the direction toward the centerline (34 or 36, respectively) of the diaper that is parallel to the respective edge of the diaper 20 along which the particular gasketing leg cuff 56 is disposed. The barrier leg cuff 62 is disposed inboard of the gasketing leg cuff 56 so that exudates, especially loose fecal material which is not easily absorbed and tends to float along the topsheet top surface 40, will contact the barrier leg cuff 62 before it can contact the gasketing leg cuff 56. The barrier leg cuff 62 is disposed adjacent the gasketing leg cuff 56 to provide a more effective dual restraint against the flow of body exudates. The barrier leg cuff 62 is preferably disposed between the flap elastic member 60 of the gasketing leg cuff 56 and the longitudinal centerline 36 of the diaper 20. Most preferably, the barrier leg cuff 62 is disposed between the flap elastic member 60 and the side edge 46 of the absorbent core 44 in the crotch region 26 of the diaper 20.

The proximal edge 64 and the distal edge 66 are in spaced relation to each other and define the width of the barrier leg cuff 62. The proximal and distal edges 64 and 66, respectively, may be in a parallel, non parallel, rectilinear or curvilinear relationship. In addition, the barrier leg cuff 62 may have a variety of different cross sectional areas including circular, square, rectangular or any other shape such as shown in Figure 3. Preferably, the proximal edge 64 is spaced from the distal edge 66 in a parallel and

rectilinear relationship to provide a barrier leg cuff 62 having uniform widths. Each barrier leg cuff 62 preferably has a width of at least about 5 mm, and preferably from about 10 mm to about 25 mm.

A preferred embodiment of the diaper 20 shown in Figures 2 and 3 is provided with the barrier leg cuff 62 joined to the topsheet 38. The term "joined" includes any means for affixing the barrier leg cuff 62 to the diaper 20, and includes embodiments wherein the barrier leg cuff 62 is a separate element having the proximal edge 64 directly or indirectly attached to the topsheet 38 (i.e., integral) or embodiments wherein the barrier leg cuff 62 is made from the same element or material as the topsheet 38 so that the proximal edge 64 is a continuous and undivided element of the topsheet (i.e., unitary). The barrier leg cuff 62 may alternatively be joined to the side flap 58, the backsheet 42, the absorbent core 44, the topsheet 38 or any combination of these or other elements of the diaper 20. In a preferred diaper 20, the barrier leg cuffs 62 are integral with the topsheet 38. The integral barrier leg cuff 62 is preferably formed by a single strip of material which is secured to the topsheet by adhesive 92, the distal edge 66 being formed by folding an end of the material back upon itself.

The distal edge 66 is preferably disposed inboard of the proximal edge 64 to present a more effective barrier against the flow of exudates. The distal edges 66 are maintained inboard of the proximal edges 64 by the adhesive means 78 so as to obviate their inversion. While the distal edges 66 may alternatively be disposed in other positions in relation to the proximal edges 64, such positions are not preferred.

The distal edge 66 is preferably not secured to any other element in at least the crotch region 26 of the diaper 20 so that it may be spaced away from the top surface 40 of the topsheet 38. The distal edge 66 is preferably spaced away from the top surface 40 of the topsheet 38 so that the barrier leg cuff 62 may form a channel 96 to enhance the containment of the article. As used herein, the term "spaced" refers to embodiments wherein the distal edges 66 may assume one or more positions relative to the top surface 40 of the topsheet 38 including positions adjacent to the top surface 40 of the topsheet 38. The distance between the distal edge 66 to the top surface 40 of the topsheet 38 is measured along a line drawn from the distal edge 66 to the closest part of the topsheet 38

when the distal edge 66 is positioned so as to be spaced away from the topsheet as far as possible. (i.e., in the elastically contracted position). Preferably, the distal edge 66 is spaced away from the topsheet 38 by a height of at least about 2 mm, and more preferably of from about 5 mm (about 1/4") to about 10 mm (3/8").

The channel 96 is formed at least along the proximal and distal edges 64 and 66 and the inboard surface 68 of the barrier leg cuff 62. The channel 96 forms a barrier to the flow of exudates as they tend to move or float across the topsheet 38. Thus the channel 96 holds and contains exudates until the diaper 20 can be removed.

In addition to barrier leg cuffs, the absorbent articles of the present invention preferably comprise gasket or gasketing leg cuffs 56. The elastically contractible gasketing leg cuffs 56 are disposed adjacent the periphery 28 of the diaper 20, preferably along each longitudinal edge 30 so that the gasketing leg cuffs 56 tend to draw and hold the diaper 20 against the legs of the wearer. While the gasketing leg cuffs 56 may comprise any of several means as are well known in the diaper art, a particularly preferred gasketing leg cuff construction comprises a flexible side flap 58 and a flap elastic member 60, as is described in detail in U.S. Patent No. 3,860,003, issued to Buell on January 14, 1975 and incorporated herein by reference. In addition, a method and apparatus suitable for manufacturing a disposable diaper having elastically contractible gasketing leg cuffs 56 are described in U.S. Patent No. 4,081,301 entitled "Method and Apparatus for Continuously Attaching Discrete, Stretched Elastic Strands to Predetermined Isolated Portions of Disposable Absorbent Articles" which issued to K. B. Buell on March 28, 1978, such patent being hereby incorporated by reference herein.

The side flap 58 should be highly flexible and thus contractible so that the flap elastic members 60 may gather the side flap 58 to provide a gasketing leg cuff 56 about the legs or waist of the wearer. The side flaps 58 are that portion of the diaper 20 between the periphery 28 and the edges of the absorbent core 44. Thus in a preferred embodiment of the present invention as shown in Figure 1, the side flaps 58 are formed from the extension of the backsheet 42 and the topsheet 38 from and along the side edges 46 of the absorbent core 44 of the diaper 20 in at least the crotch region 26.

The flap elastic members 60 are secured to the side flaps 58 in an elastically contractible condition so that in a normally unrestrained configuration, the flap elastic members 60 effectively contract or gather the side flaps 58. The flap elastic members 60 can be secured to the side flaps 58 in an elastically contractible condition in at least two ways. For example, the flap elastic members 60 may be stretched and secured to the side flaps 58 while the side flaps 58 are in an uncontracted condition. Alternatively, the side flaps 58 may be contracted, for example by pleating, and the flap elastic members 60 secured to the contracted side flaps 58 while the flap elastic members 60 are in their unrelaxed or unstretched condition.

In the embodiment illustrated in Figure 1, the flap elastic members 60 extend essentially the entire length of the side flaps 58 in the crotch region 26 of the diaper 20. Alternatively, the elastic members 60 may extend through the entire length of diaper 20, or any other length suitable to provide an elastically contractible gasketing leg cuff 56. The length of the flap elastic members 60 is dictated by the diaper's design.

In the diaper 20 of Figure 3, the flap elastic members 60 are associated with the side flaps 58 by securing them to the side flaps 58 with elastic attachment elements 90. The elastic attachment elements 90 should be flexible and of sufficient adhesiveness to hold the flap elastic member in its stretched condition. The elastic attachment elements 90 herein are preferably glue beads made of hot melt adhesives such as those marketed by Findley Adhesives Incorporated, Elm Grove, Wis. as Findley Adhesives 581. A more detailed description of the manner in which the flap elastic members 60 may be positioned and secured to the diaper 20 can be found in U.S. Patent No. 4,253,461 issued to Strickland and Visscher on Mar. 3, 1981, and U.S. Patent No. 4,081,301 issued to Buell on Mar. 28, 1978, both of which patents are hereby incorporated by reference herein.

One flap elastic member 60 which has been found to be suitable is an elastic strand having a cross section of 0.18 mm by 1.5 mm and made from natural rubber as available from Easthampton Rubber Thread Company of Stewart, Va., under the trademark L-1900 Rubber Compound. Other suitable flap elastic members 60 can be made from natural rubber, such as elastic tape sold under the trademark Fulflex 9211 by Fulflex Company of Scotland, N.C. The flap elastic member 60 may also comprise any heat shrinkable elastic

material as is well known in the art. Other suitable flap elastic members 60 may comprise a wide variety of materials as are well known in the art including elastomeric films, polyurethane films, elastomeric foams, and formed elastic scrim.

In addition, the flap elastic members 60 may take a multitude of configurations. For example, the width of the flap elastic members 60 may be varied from about 0.25 mm (0.01 inches) to about 25 mm (1.0 inch) or more; the flap elastic members 60 may comprise a single strand of elastic material or may comprise several parallel or non-parallel strands of elastic material; or the flap elastic members 60 may be rectilinear or curvilinear. Still further, the flap elastic members 60 may be affixed to the diaper 20 in any of several ways which are well known in the art. For example, the flap elastic members 60 may be ultrasonically bonded, heat/pressure sealed into the diaper 20 using a variety of bonding patterns or the elastic members 60 may simply be glued to the diaper 20.

The elasticized waist feature preferably comprises an elasticized waistband (not shown) that may be constructed in a number of different configurations including those described in U.S. Patent No. 4,515,595 issued to Kievit, et al. on May 7, 1985; U.S. Patent No. 5,026,364 issued to Robertson on Jun. 25, 1991; and the above referenced U.S. Patent No. 5,151,092 issued to Buell, et al. on Sept. 29, 1992, each of these references being incorporated herein by reference.

The elasticized side panels may be constructed in a number of configurations. Examples of diapers with elasticized side panels positioned in the ears (ear flaps) of the diaper are disclosed in U.S. Patent No. 4,857,067, issued to Wood, et al. on Aug. 15, 1989; U.S. Patent No. 4,381,781, issued to Sciaraffa, et al. on May 3, 1983; U.S. Patent No. 4,938,753, issued to Van Gompel, et al. on Jul. 3, 1990; and U.S. Patent No. 5,151,092, issued to Buell, et al. on Sept. 29, 1992; each of which patents is hereby incorporated by reference herein.

Exemplary fastening systems 54 are disclosed in U.S. Patent No. 4,846,815, issued to Scripps on July 11, 1989; U.S. Patent No. 4,894,060, issued to Nestegard on Jan. 16, 1990; U.S. Patent No. 4,946,527, issued to Battrell on Aug. 7, 1990; U.S. Patent No. 3,848,594, issued to Buell on Nov. 19, 1974; U.S. Patent No. B1 4,662,875, issued to

Hirotsu, et al. on May 5, 1987; and U.S. Patent No. 5,151,092, issued to Buell, et al. on Sept. 29, 1992; each of which patents is hereby incorporated by reference herein.

Figure 4 is a perspective view of the diaper 20 in its elastically contracted position prior to being placed on the wearer. The topsheet 38 is shown as the body contacting surface of the diaper 20, the backsheet 42 being disposed away from the body of the wearer. The gasketing leg cuffs 56 are shown to be gathered or contracted by the flap elastic members (not shown in Figure 4). The diaper 20 is shown as having two barrier leg cuffs 62 extending adjacent to and inboard of the gasketing leg cuffs 56. The distal edges 66 are shown to be gathered and contracted by the spacing elastic members (not shown) in the crotch region 26 so as to provide a longitudinally extending channel 96 along the diaper 20. In addition, the ends 72 and 74 of the barrier leg cuff 62 are secured closed in the front and back closure zones 80 and 82, respectively, so as to provide comfort for the wearer, to obviate inversion of the barrier leg cuffs, and for ease of application of the diaper.

The diaper 20 is applied to a wearer, by positioning the back waist region 24 under the wearer's back, and drawing the remainder of the diaper 20 between the wearer's leg so that the front waist region 22 is positioned across the front of the wearer. The ends of the tape-tab fasteners 54 are then secured preferably to outwardly facing areas of the diaper 20. In this manner, the barrier leg cuffs 62 should be disposed in the crotch region of the wearer and should provide the dispositions and functions described hereinbefore. Once applied, the distal edges 66 of the barrier leg cuffs 62 extend through the groin areas and diverge upwardly along both of the buttocks of the wearer. Neither of the barrier leg cuffs 62 encircle the thighs of the wearer. However, the gasketing leg cuffs 56 will encircle the thighs and create a gasketing action against the thighs. The ends of the barrier leg cuff 62 are secured to the topsheet 38 to obviate the inversion of the barrier leg cuffs, for comfort for the wearer during application and use, and for ease of application.

The skin care or lotioned leg cuffs of the present invention are also useful in training pants. The term "training pants", as used herein, refers to disposable garments having fixed sides and leg openings. Training pants are placed in position on the wearer by inserting the wearer's legs into the leg openings and sliding the training pant into

position about the wearer's lower torso. Suitable training pants are disclosed in U.S. Patent No. 5,246,433, issued to Hasse, et al. on September 21, 1993. The lotioned leg cuffs of the present invention are also applicable to absorbent articles that are a combination or "hybrid" of training pants and diapers.

Another disposable absorbent article for which the lotioned leg cuffs of the present invention are useful are incontinence articles. The term "incontinence article" refers to pads, undergarments (pads held in place by a suspension system of same type, such as a belt, or the like), inserts for absorbent articles, capacity boosters for absorbent articles, briefs, bed pads, and the like regardless of whether they are worn by adults or other incontinent persons. Suitable incontinence articles are disclosed in U.S. Patent No. 4,253,461 issued to Strickland, et al. on March 3, 1981; U.S. Patent Nos. 4,597,760 and 4,597,761 issued to Buell; the above-mentioned U.S. Patent No. 4,704,115; U.S. Patent No. 4,909,802 issued to Ahr, et al.; U.S. Patent No. 4,964,860 issued to Gipson, et al. on October 23, 1990; and in U.S. Patent Application Serial No. 07/637,090 filed by Noel, et al. on January 3, 1991 (PCT Publication No. WO 92/11830 published on July 23, 1992); each above-mentioned patent and publication being hereby incorporated by reference herein.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A method for applying a controlled amount of a skin care composition to a web having a first surface and a second surface to form a web having a skin care composition immobilized on at least one surface thereof that is capable of being transferred from the web upon contact with skin, the method comprising the steps of:
 - a. providing at least one transfer apparatus with a skin care composition therein, the skin care composition comprising an emollient and an immobilizing agent;
 - b. providing a web;
 - c. positioning the web in proximity with the transfer apparatus; and
 - d. applying an effective amount of the skin care composition to the web from the transfer apparatus such that at least a portion of the web has disposed thereon an effective amount of the skin care composition coating at least partially transferable at contact of the web, the skin care composition ranging from between a solid state to a liquid state at between about 20°C to about 204°C at application of the skin care composition to the web.
2. The method of Claim 1 wherein the transfer apparatus directly transfers the skin care composition to the web.
3. The method of Claim 1 additionally comprising the step of holding the web under tension between at least two points as the skin care composition is transferred to the web.
4. The method of Claim 3 wherein the step of transferring the skin care composition to the web comprises rolling the skin care composition onto at least one surface of the web.

5. The method of Claim 4 wherein the transfer apparatus comprises a gravure coating device.
6. The method of Claim 1 wherein the transfer apparatus comprises a first roller and a second roller positioned oppositely to the first roller.
7. The method of Claim 6 the positioning step comprises the step of positioning the web between the first roller and the second roller.
8. The method of Claim 7 wherein additionally comprising the step of applying the skin care composition to the first roller.
9. The method of Claim 8 wherein the transferring step comprises transferring the skin care composition from the first roller to the web.
10. The method of Claim 9 wherein the first roller and the second roller form a roller coater.
11. The method of Claim 10 wherein the roller-coaters comprise a hollow idler roller, a porous structure fitted about the idler roller, and a transporter device reaching through the idler roller into the porous structure to deliver the skin care composition to the porous structure.
12. The method of Claim 1 wherein the transfer apparatus comprises a slot having a first plate and a second plate spaced apart from the first plate, a width and a slot exit positioned at the end of the slot.
13. The method of Claim 12 wherein transferring step comprises extruding the skin care composition from the slot through the slot exit to the web.
14. The method of Claim 12 wherein the transfer apparatus is a slot coat applicator.
15. The method of Claim 1 wherein the transfer step comprises applying the skin care composition to the first surface of the web and allowing the skin

care composition to penetrate through the web onto the second surface of each the web.

16. The method of Claim 1 wherein the transfer apparatus comprises at least one sprayer mounted above the web wherein said transferring step comprises spraying the skin care composition onto the web.
17. The method of Claim 16 wherein the at least one of the sprayers is mechanically manipulatable such that at least one of the sprayers may rotate about a point such that said spraying step comprises spraying the skin care composition onto the web at various angles, distances or onto both sides of the web.
18. The method of Claim 16 wherein the spraying apparatus additionally comprises an enclosure having at least one sprayer positioned therein, the method additionally comprising the step of conveying the web through the enclosure of the spraying apparatus.
19. The method of Claim 16 wherein the transfer apparatus comprises a plurality of sprayers such that said spraying step comprises spraying the skin care composition onto said web at a plurality of locations.
20. The method of Claim 16 wherein the step of spraying the skin care composition comprises propelling the skin care composition through a spray nozzle with air.
21. The method of Claim 16 wherein the step of spraying the skin care composition comprises propelling the skin care composition through a spray nozzle substantially without air.
22. The method of Claim 16 wherein said step of spraying comprises mechanically manipulating the spray nozzle during spraying to form at least one spray pattern.

23. The method of Claim 16 wherein the spray pattern resulting from the mechanical manipulation of the nozzle is selected from the group comprising spirals, squares, stripes, circles, any of a number of multi-sided shapes, discontinuous shapes and combinations thereof.
24. The method of Claim 1 further comprising the step of cooling the skin care composition on the web to solidify the skin care composition.
25. The method of Claim 24 wherein the cooling of the skin care composition onto the web is performed by a cooling apparatus.
26. The method of Claim 25 wherein the cooling apparatus is selected from the group consisting of a chilled roll, chilled plate, chilled air and combinations thereof.
27. The method of Claim 1 wherein the transfer apparatus comprises a bath containing the skin care composition and idle rollers for manipulating the web into the skin care composition such that said transfer step comprises the steps of positioning the web into the bath by manipulating the web about the idle rollers.
28. The method of Claims wherein the cooling step comprises the step of air drying the skin care composition on the web.
29. The method of Claim 1 or 27 additionally comprising the step of heat-curing the skin care composition on the web.
30. The method of Claim 1 wherein the web is selected from the group consisting of nonwovens, polyethylenes, polypropylenes, rubber, and combinations thereof.
31. The method of Claim 30 wherein additionally comprising the step of conveying the web to a forming apparatus and manipulating the web to form a leg cuff for an absorbent article.

32. The method of Claim 31 wherein the leg cuff is selected from the group consisting of barrier leg cuffs, gasketing leg cuffs and combinations thereof.
33. The method of Claim 1 wherein transferring step comprises applying the skin care composition at variable concentration levels on different portions of the web so as to form denser concentrations at portions of the web.
34. The method of Claim 33 wherein said application step comprises applying the skin care composition in patterns of variable densities on the web.
35. The method of Claim 34 wherein the patterns may be selected from the group comprising spirals, squares, stripes, circles, any of a number of multi-sided shapes, discontinuous shapes and combinations thereof.
36. The method of Claim 1 further comprising the step of contacting the web to a secondary web and transferring substantially all of the skin care composition thereon onto the secondary web.
37. The method of Claim 36 additionally comprising the step of contacting a third web to the second web and transferring substantially all of the skin care composition thereon to the third web.
38. The method of Claim 1 wherein the transfer apparatus comprises a chamber having an entrance way positioned at one end, an exit way positioned at the opposite end, and a screwing mechanism extending substantially from the entrance way to the exit way of the chamber.
39. The method of Claim 38 wherein said transfer step comprises conveying the skin care composition into the chamber of the transfer apparatus at the entrance way of the chamber.
40. The method of Claim 39 additionally comprising the step of propelling the skin care composition through the chamber via mechanically moving the

skin care composition through the chamber and out of the exit way by the screwing mechanism.

41. The method of Claim 40 wherein the exit way of the chamber comprises a nozzle.
42. The method of Claim 40 wherein the chamber of the transfer apparatus is an extruder.
43. A method for applying a controlled amount of a skin care composition to a web having a first surface and a second surface to form a web having a skin care composition immobilized on at least one surface thereof that is capable of being transferred from the web upon contact with skin, the method comprising the steps of:
 - a. providing at least one transfer apparatus with a skin care composition, said skin care composition comprising an emollient and an immobilizing agent, wherein the transfer apparatus comprises a slot having a first plate and a second plate spaced apart from the first plate, a width and a slot exit positioned at the end of the slot;
 - b. providing a web;
 - c. positioning the web to be in proximity with the transfer apparatus; and
 - d. applying an effective amount of the skin care composition to the web through the slot exit of the transfer apparatus, wherein at least a portion of the web has disposed thereon an effective amount of the skin care composition, the skin care composition ranging from between a solid state to a liquid state at between about 20°C to about 204°C at application of the skin care composition to the web.
44. The method of Claim 43 wherein the transfer apparatus is a slot coat applicator.

45. The method of Claim 43 further comprising the step of cooling the skin care composition onto the web during or after the web is conveyed from the transfer apparatus.
46. The method of Claim 45 wherein the cooling of the skin care composition onto the web is performed by a cooling apparatus.
47. The method of Claim 46 wherein the cooling apparatus is selected from the group consisting of a chilled roll, chilled plate, chilled air and combinations thereof.
48. The method of Claim 43 wherein the web is air-dried some time after the skin care composition has been transferred to the web.
49. The method of Claim 43 wherein the web is heat-cured some time after the skin care composition has been transferred to the web.
50. A method for applying a controlled amount of a skin care composition to a web having a first surface and a second surface to form a web having a skin care composition immobilized on at least one surface thereof that is capable of being transferred from the web upon contact with skin, the method comprising the steps of:
 - a. providing a web;
 - b. providing at least one transfer apparatus with a skin care composition therein, the skin care composition comprising an emollient and an immobilizing agent, the transfer apparatus comprising at least one sprayer mounted in proximity to the web;
 - c. positioning the web to be in proximity with the at least one sprayer of the transfer apparatus; and
 - d. applying an effective amount of the skin care composition to the web from the transfer apparatus such that at least a portion of the web has disposed thereon an effective amount of the skin care composition

coating at least partially transferable at contact of the web, the skin care composition ranging from between a liquid state at between about 20°C to a molten state at about 204°C at application of the skin care composition to the web.

51. The method of Claim 50 wherein at least one of the sprayers is mechanically manipulatable such that at least one of the sprayers may rotate about a point and spray the skin care composition onto the web at various angles, distances and on both sides of the web.
52. The method of Claim 50 wherein the skin care composition is air dried or heat dried during or after the web is conveyed away from the transfer apparatus.
53. The method of Claim 50 wherein the skin care composition is cooled on the web where the skin care composition is applied to the web at elevated temperatures.
54. The method of Claim 50 wherein the transfer apparatus comprises an enclosure having at least one sprayer positioned therein for spraying the web with a skin care composition as the web is positioned in proximity to the transfer apparatus.
55. The method of Claim 50 wherein the transfer apparatus comprises a plurality of sprayers.
56. The method of Claim 50 wherein the spraying of the skin care composition by the sprayer therefor is propelled through a spray nozzle with air.
57. The method of Claim 50 wherein the spraying of the skin care composition by the sprayer is propelled through a spray nozzle substantially without air.
58. The method of Claim 57 wherein the spray of the skin care composition is propelled through at least one nozzle being mechanically manipulated

during the spraying such that at least one spray pattern may result from the spraying.

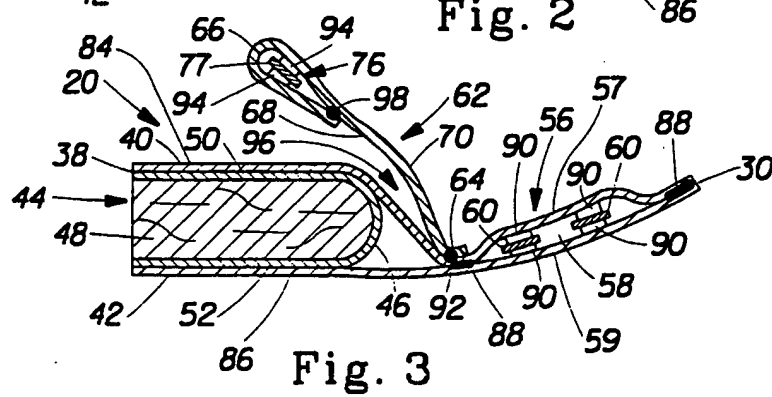
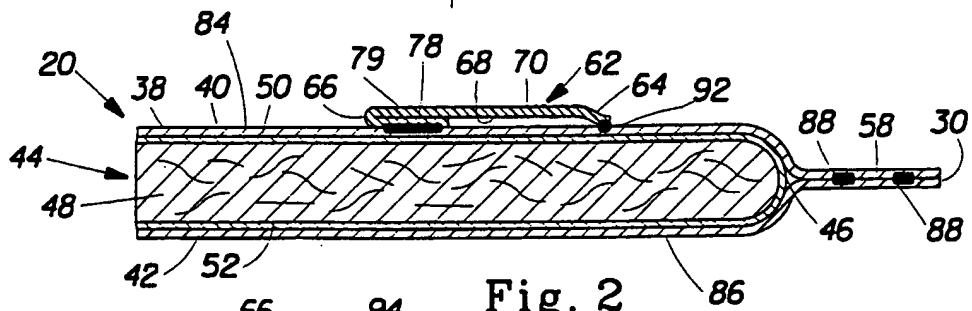
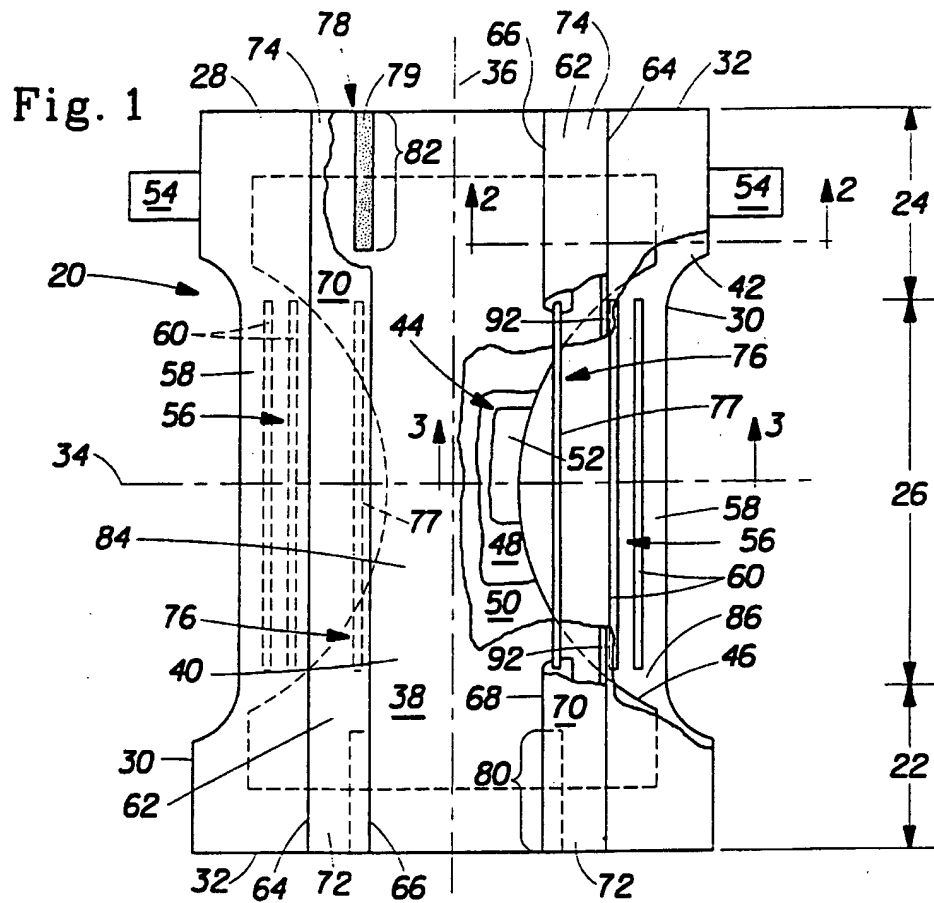
59. The method of Claim 50 wherein the spray pattern resulting from the nozzle is selected from the group comprising spirals, squares, stripes, circles, any of a number of multi-sided shapes, discontinuous shapes and combinations thereof.
60. The method of Claim 50 wherein the spraying of the skin care composition is intermittent or discontinuous.
61. The method of Claim 50 wherein the spraying of the skin care composition is continuous.
62. The method of Claim 50 wherein the skin care composition is controllably sprayed onto the web such that substantially only a prescribed amount of the skin care composition is applied to the web.
63. A method for applying a controlled amount of a skin care composition to a web having a first surface and a second surface to form a web having a skin care composition immobilized on at least one surface thereof that is capable of being transferred from the web upon contact with skin, the method comprising the steps of:
 - a. providing a web having a first surface and a second surface;
 - b. providing at least one transfer apparatus with a skin care composition therein in a solid state, the skin care composition comprising an emollient and an immobilizing agent;
 - c. positioning the web to be in close proximity to the transfer apparatus;
 - d. contacting the web with the skin care composition in the transfer apparatus; and

- e. applying an effective amount of the skin care composition to at least a portion of the web from the transfer apparatus such that at least a portion of the web has disposed thereon an effective amount of the skin care composition coating at least partially transferable at contact of the web.
64. The method of Claim 63 wherein the transfer apparatus comprises at least one cache or housing which encompasses the skin care composition, whereby at application of the skin care composition to the web, an effective amount of the skin care composition is pushed through the cache and touches the web for transfer of an effective of the skin care composition to the web.
65. The method of Claim 63 wherein the transfer apparatus applies the skin care composition to the web at an application angle ranging from about 0° to about 360°.
66. The method of Claim 65 wherein the application angle ranges from about 45° to about 135°.
67. The method of Claim 66 wherein the application angle ranges from about 75° to about 105°.
68. A method for applying a controlled amount of a skin care composition to a diaper web having a top surface, a bottom surface, topsheet, a backsheet joined to the topsheet, and an absorbent core positioned between the topsheet and the backsheet to form a diaper web having a skin care composition immobilized on at least one surface thereof that is capable of being transferred from the web upon contact with skin, the method comprising the steps of:
- a. providing at least one transfer apparatus with a skin care composition therein, the skin care composition comprising an emollient and an immobilizing agent;

- b. providing a diaper web;
 - c. positioning the diaper web to be in proximity with the transfer apparatus;
 - d. applying an effective amount of the skin care composition to at least a portion of the top surface of the diaper web from the transfer apparatus, wherein at least a portion of the diaper web has disposed thereon an effective amount of the skin care composition coating, the skin care composition ranging from between a solid state to a liquid state at between about 20°C to about 204°C at application of the skin care composition to the web; and
69. The method of Claim 68 wherein the skin care composition is applied substantially to the entire surface of the topsheet of the diaper web.
70. The method of Claim 68 wherein the skin care composition is applied less than substantially to the topsheet of the diaper web.
71. The method of Claim 68 wherein the skin care composition is applied in a stripe along the surface of the topsheet of the diaper web.
72. The method of Claim 68 wherein the skin care composition is applied nonuniformly onto the top surface of the diaper web.
73. The method of Claims 68 or 72 wherein the skin care composition is applied discontinuously onto the top surface of the diaper web.
74. The method of Claim 68 wherein the diaper web comprises leg cuffs having a first surface facing upwards away from the diaper web and a second surface facing down towards the diaper web when the diaper web is in a flattened-out, uncontracted position.
75. The method of Claim 74 wherein the skin care composition is applied substantially only to the first surface of the leg cuffs of the diaper web.

76. The method of Claim 75 wherein the skin care composition is applied substantially to the entire surface of the leg cuffs of the diaper web.
77. The method of Claim 75 wherein the skin care composition is applied only to a portion of the leg cuffs of the diaper web.
78. The method of Claim 75 wherein the skin care composition is applied in a stripe along the surface of the leg cuffs of the diaper web.
79. The method of Claim 75 wherein the skin care composition is applied nonuniformly onto the leg cuffs of the diaper web.
80. The method of Claims 75 or 79 wherein the skin care composition is applied discontinuously onto the topsheet of the diaper web.

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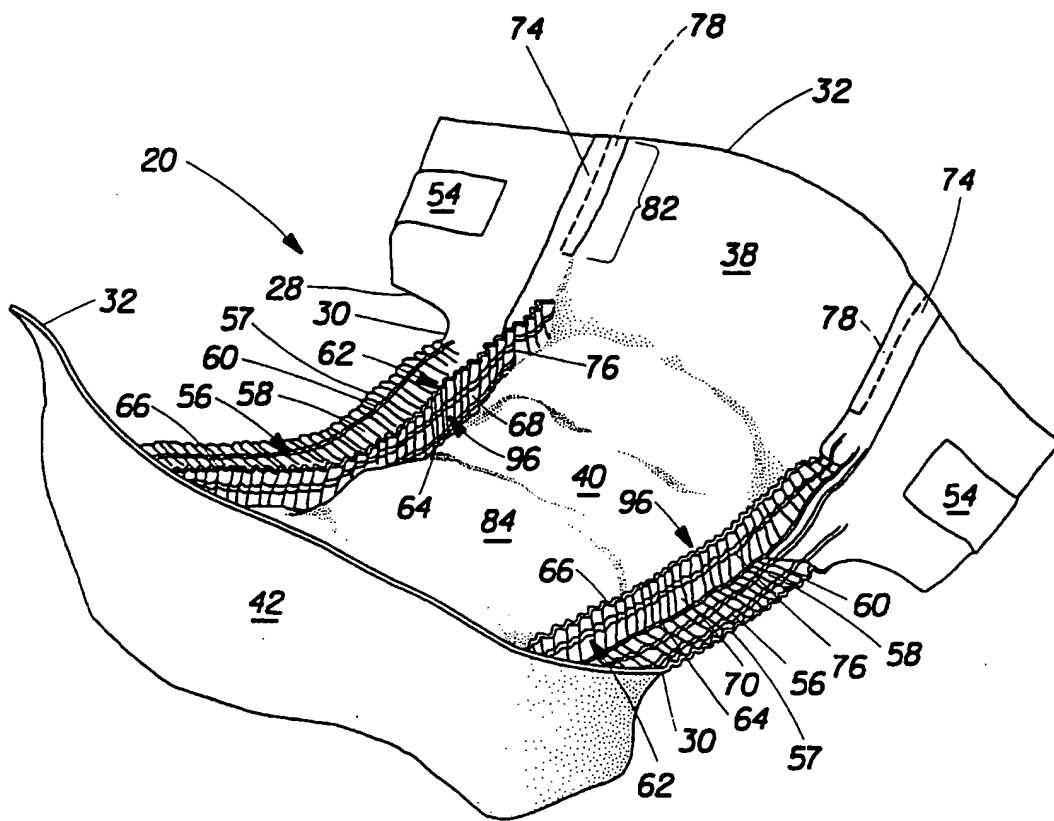


Fig. 4

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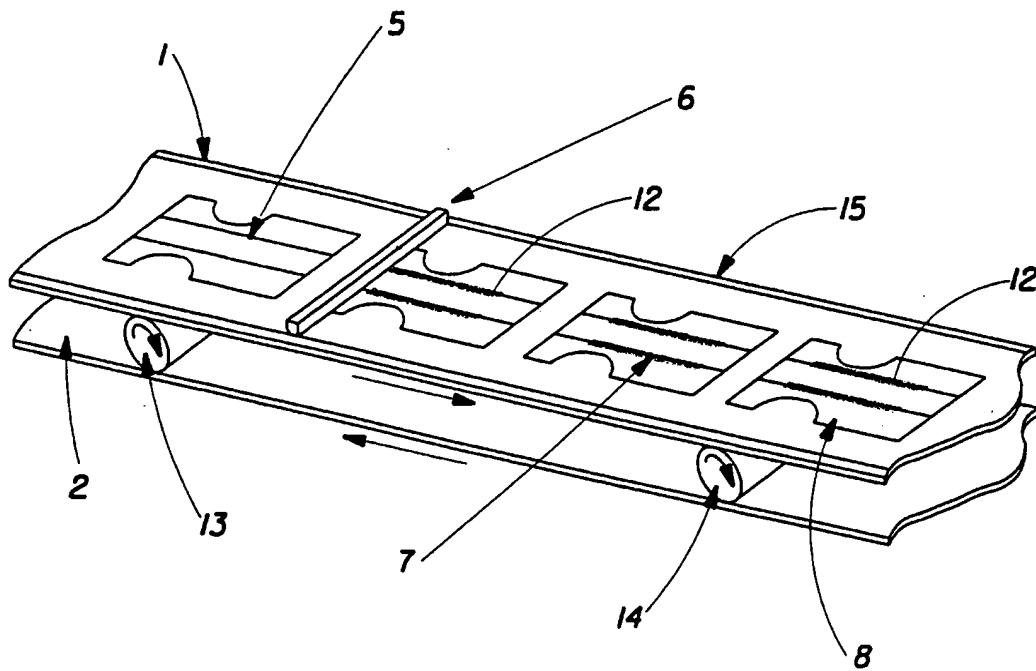


Fig. 5

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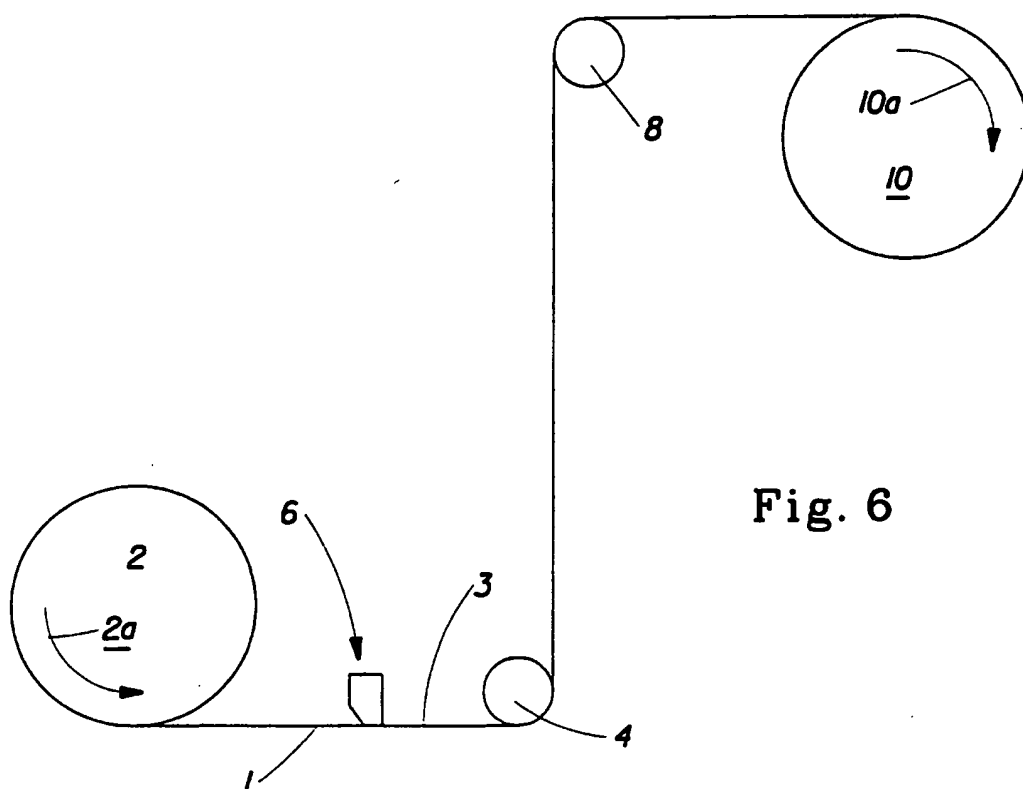


Fig. 6

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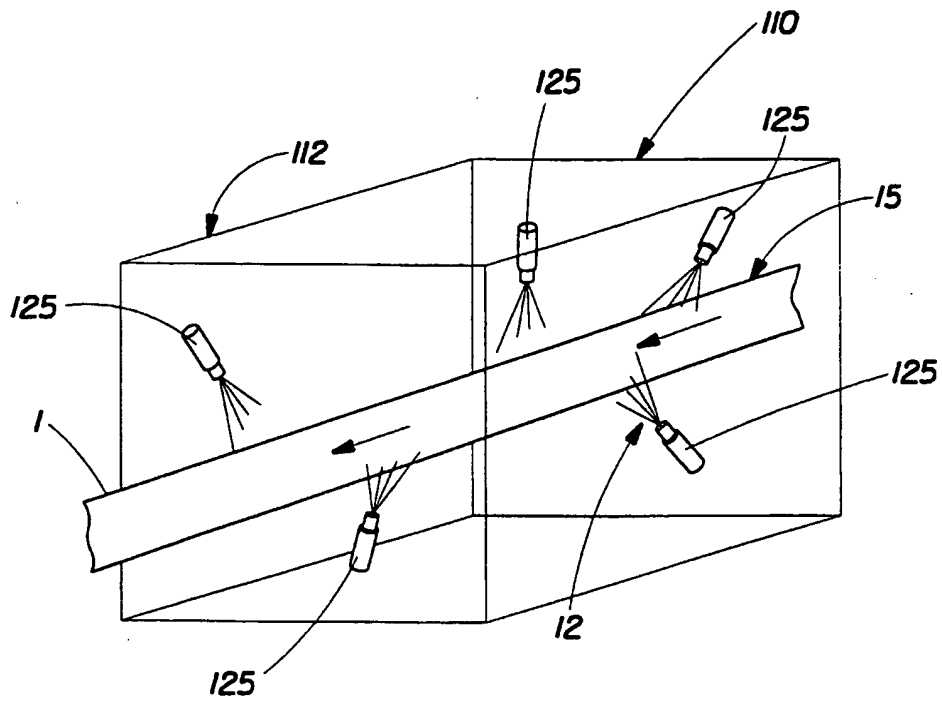


Fig.7A

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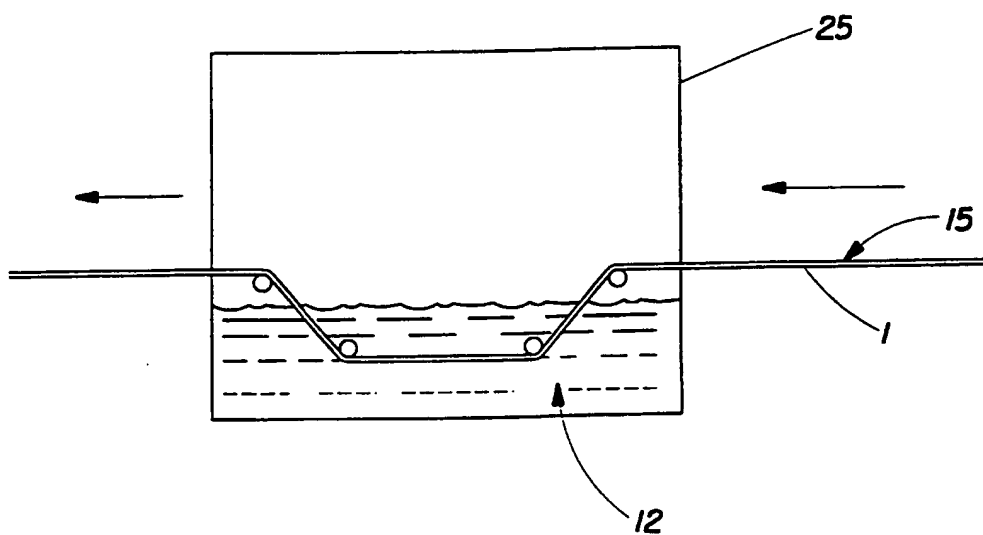


Fig.7B

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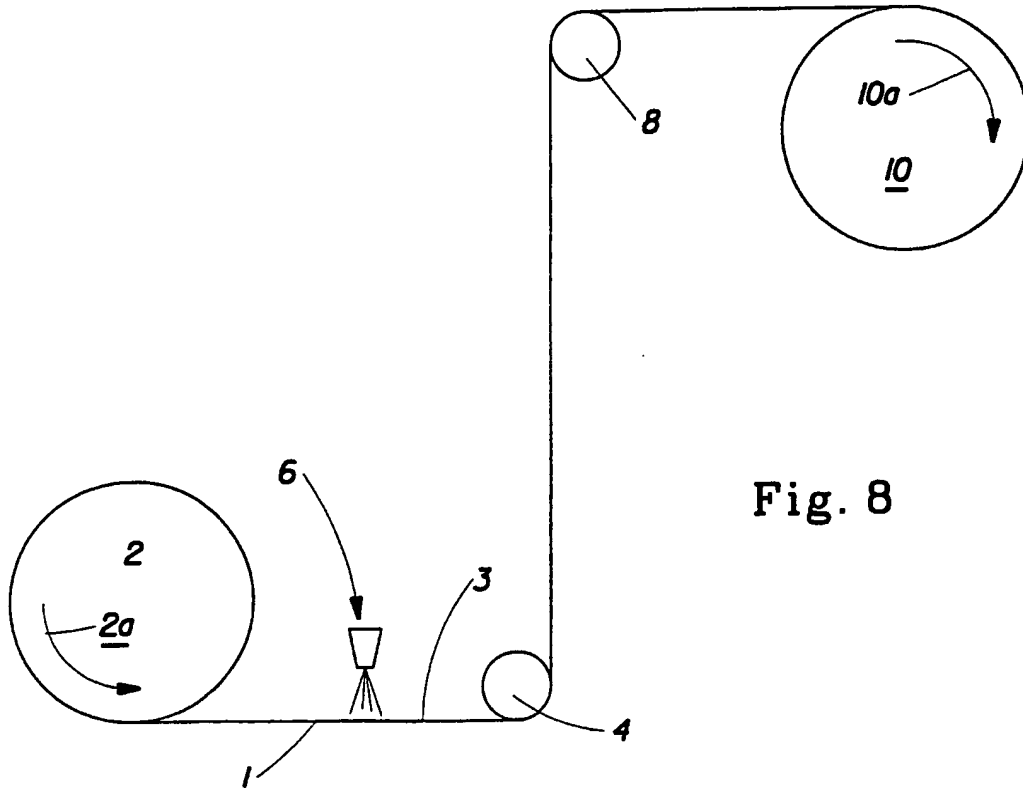


Fig. 8

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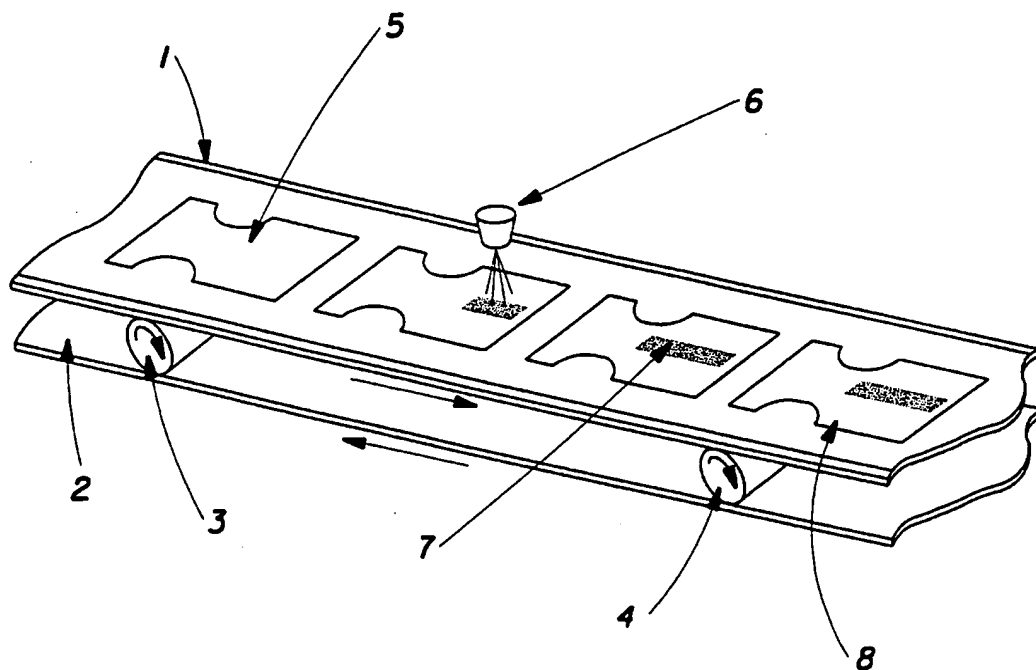


Fig. 9

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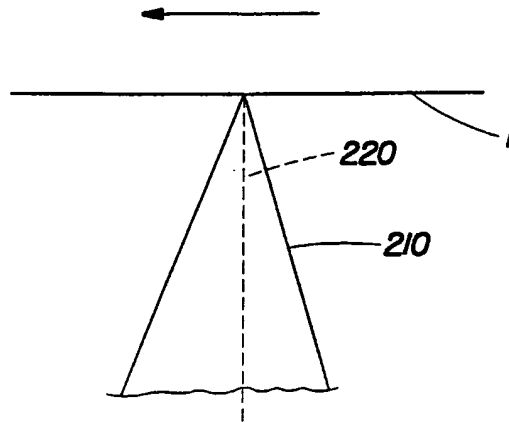


Fig. 10A

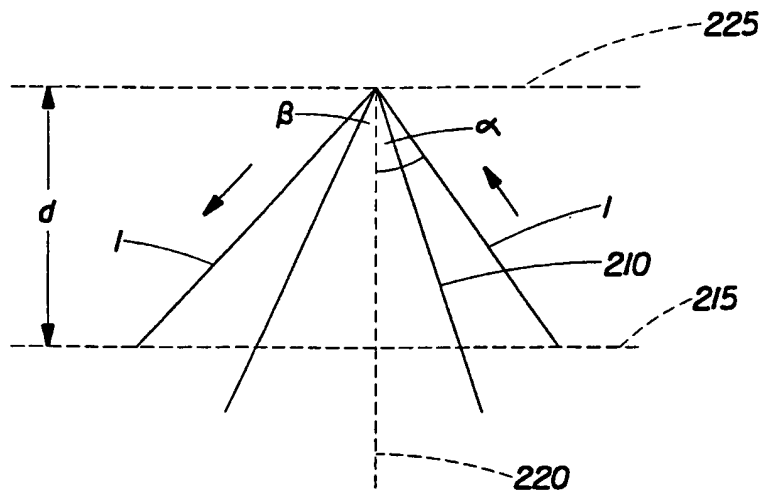


Fig. 10B

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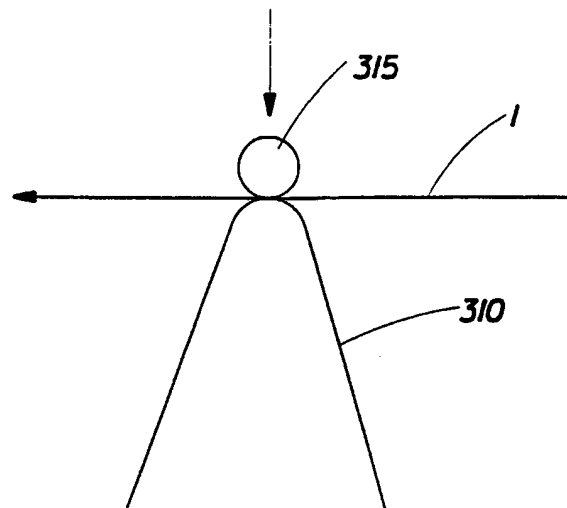


Fig. 11A

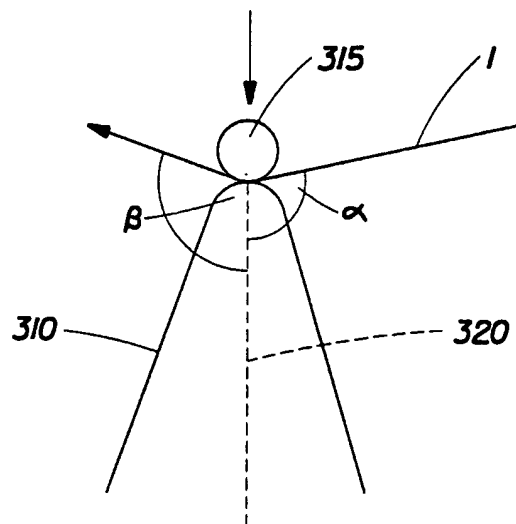


Fig. 11B

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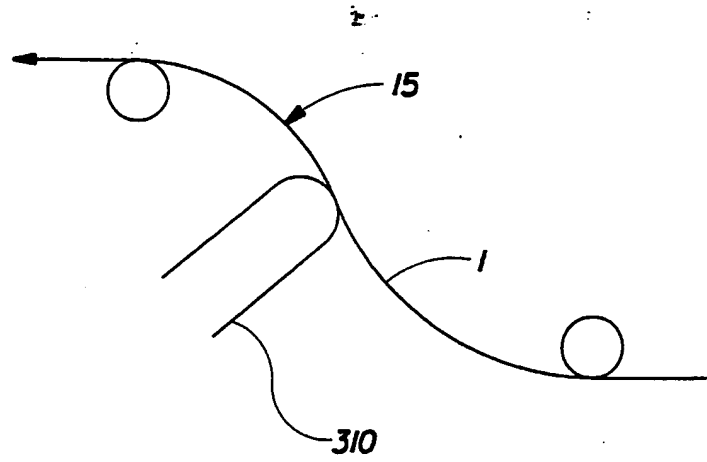


Fig. 11C

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/04180

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>WO 98 24390 A (PROCTER & GAMBLE) 11 June 1998 (1998-06-11)</p> <p>page 1, line 9 - line 19 page 25, line 9 - page 26, line 16 page 33, line 22 - line 28 page 34, line 4 - line 8 page 43, line 33 - page 44, line 4 page 44, line 21 - line 23 page 46, line 6 - line 9; figures 4,5</p> <p>--- -/--</p>	<p>1-5,10, 12,14, 16,22, 23, 30-32, 35,43, 44,50, 59,63, 68,75-79</p>

☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

29 June 2000

Date of mailing of the international search report

11/07/2000

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/04180

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 5 635 191 A (MACKEY LARRY N ET AL) 3 June 1997 (1997-06-03) cited in the application abstract column 1, line 7 - line 15 column 1, line 40 - line 48 column 2, line 64 - column 3, line 2 column 19, line 48 - line 63; figures 1,2 -----	1,2,4,5, 16,30, 38,42, 50,63, 68-71,80
A	US 4 753 643 A (KASSAI KENZOU) 28 June 1988 (1988-06-28) column 4, line 10 - line 38; figure 16 -----	1,32,43, 50,63,68

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